ADVANCED RAIL TECHNOLOGY

HEARINGS

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS

OF THE

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[1] On assignment to Budget Committee for 97th Congress.

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ADVANCED RAIL TECHNOLOGY

MONDAY, APRIL 5, 1982

House of Representatives,
Committee on Science and Technology,
Subcommittee on Transportation, Aviation and Materials,
Washington, D.C.

The subcommittee met, pursuant to call at 9:30 a.m., in room 2325, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Mr. Glickman. Good morning.

I am delighted to see this large crowd in attendance.

As most people know, the House is not in session, at least formally, this week. So many Members did leave Washington for their districts. We should be getting some additional Members fairly soon.

Today the Subcommittee on Transportation, Aviation, and Materials will begin 2 days of hearings on advanced rail technology and the future of American rail transportation.

The purpose of these hearings is to assess the technological needs and opportunities of American rail transportation in order to lay the basis for future national transportation policy.

The transportation infrastructure of the United States is perhaps the most elaborate and extensive in the world. However, in spite of the advantages of that infrastructure, elements of our transportation system are already congested.

Forecasts indicate that unless there are massive investments in maintenance and capacity expansion, nearly one-third of our commercial airports will have reached saturation by 1990.

In addition, by 1990 our interstate highway systems will be operating at nearly 150 percent capacity in 27 States, and increased movement of coal will choke segments of our rail system.

Although the U.S. rail system moves an incredible amount of bulk freight and commodities, railroads have steadily lost their market share for both passenger and freight traffic since World War II.

Railroads continue to face the problem of obsolete and deteriorated track, facilities and equipment caused to some extent by inadequate earnings. That results in poor service which, in turn, encourages shippers and passengers to seek other modes of transportation.

The average speed of a freight train in the United States is currently 20 miles per hour. For a passenger train, the average speed is 46 miles per hour. Much of the equipment and many operating procedures are technologically obsolete. Speed and reliability are degraded by inefficient terminals and substandard physical plant. The lack of reliability for rail freight and passenger service is accepted within the industry as inevitable.

While Japan, France, Germany, and other countries are making significant advances in high speed rail technology, the U.S. rail system continues to deteriorate at an escalating rate.

While the Japanese bullet train is producing a substantial profit, many in the United States continue to insist that passenger trains cannot be profitable.

While the French TGV set the world speed record of 236 miles per hour, many continued to insist that passenger trains cannot practically move faster than they do today in the United States.

Americans have been diverted from, but have not lost their great love and respect for transportation by rail. High-speed rail technology could provide us with the means to take the pressure off other modes of transportation since it is an energy efficient and potentially competitive option for short and intermediate range passenger travel.

The technology is available. I believe Congress should look into this option and I am pleased that a number of expert witnesses have agreed to appear before the subcommittee to discuss these and other related issues.

Our first witness, in a very distinguished group of witnesses, is the chairman of the Joint Economic Committee, a Congressman who, unfortunately, is not going to be with us next year. He is a gentleman who has had as much to do with economic thinking in America as perhaps any Member of Congress, and one who, more pointedly to this hearing, has taken the lead in showing that improving our rail network, our rail transportation system, can have a great deal to do with revitalizing the American economy.

That is our colleague from Wisconsin, the Honorable Henry Reuss.

STATEMENT OF THE HON. HENRY S. REUSS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WISCONSIN

Mr. Reuss. Thank you, Mr. Chairman.

I have a rather too lengthy written statement which, under the rule, I would like to recommend for inclusion in the record. Then, in accordance with the high speed motif of this hearing, I will proceed orally to sum it up.

Mr. Glickman. Your entire statement will appear in the record. You may proceed in any way you wish.

Mr. Reuss. The Joint Economic Committee has necessarily been concerned with what is called the reindustrialization of America, and, as you know, Mr. Chairman, there are many ideas on this subject.

On looking things over, we decided that there are some ways in which we shouldn't go. One is to pick losers. We have been very good at that in the past, picking steel mills that were about to go under, shipyards about to be seized by the sheriff, and other feckless ventures. Picking losers both here and abroad, has not been a good way to go.

Picking winners sounds simply wonderful, but the only problem is how do you pick a winner? Some of the efforts in France and Japan, for instance, at picking winners have not been all that glorious.

We finally concluded that what makes the most sense is certainly not to pick losers, and not to try the impossible of picking all winners, but to pick catalysts—those industries and sectors which offer an opportunity of forward and backward and sideways motion which can set the economy going again.

Our list is not long. So far we have identified semiconductors, coal, and high-speed passenger rail in our 20 leading corridors, as the kind of catalysts which it is worthwhile in to back new forms of Government/private sector activity.

We have come forth with a small report on high-speed passenger rail, which just scratched the surface. That is why we are so delighted that this great committee, which has much more expertise at things scientific and technical than we do, is taking a very hard and comprehensive look at it.

In a sense what we are now advocating is the redress of World War II.

In World War II, American bombers wiped out all the obsolete technical equipment of Japan and Germany and, in the process, most of the fully depreciated capital of all of Western Europe.

Then we, with our technology relatively undisturbed and buoyed up by the war years, generously and sensibly shared our technical know-how with the people of Japan and Europe, with the result that today in many areas they are ahead of us.

Meanwhile, and in the years since, we were doing a bombing act of our own on what had been a marvelous American field of transportation—the rail system. The Government doomed passenger rail very largely by providing a huge subsidized highway system and FHA and other aids for suburbs. So the automobile acquired a marvelous market which, married to an aggressive private industry, did the job. Meanwhile, freight rail got itself into a position, in its competition with trucks and other competing methods of transportation, whereby freight trains got longer, heavier, and slower. Any chance that passenger rail had of making a comeback went glimmering because passenger rail had to deadhead back of slow freight trains.

The pitch or tilt of the tracks, in order to accommodate these heavier freight trains, made it impossible to operate a passenger train at more than 30 or 40 miles an hour without derailing. The heaviness of the freight trains meant the wear and tear on the roadbed was such that you got an inadvertent massage if you tried to ride a passenger train going more than a few miles an hour.

So our own activities spelled the end of passenger rail.

Meanwhile, abroad—particularly in Japan, France, Germany, Great Britain, and other countries—great breakthroughs were being made. Now, as your opening statement pointed out, Mr. Chairman, we may be a country, part of whose technology has been self-bombed for the reasons I have described, in the happy position to take advantage of the technology developed by our friends.

I have been very heartened at the attitude of the Japanese, the French, and others.

As you know, there is in being the Japan-United States Rail Congress which has met here in the United States and will meet again in Japan next June or July.

The first fruits of that cooperative effort are already beginning to show. The Japanese are in on the San Diego-Los Angeles corridor. They are taking a look at some other corridors, and I, for one, welcome their know-how, their capital, their entrepreneurship, to bring about part of our own reindustrialization.

In our country we can, in the 20 leading 200- to 300-mile corridors, enjoy high-speed passenger rail service of 200 miles an hour. In the process, we can develop whole new industries dedicated to the making of locomotives, passenger cars, electronic equipment, and communications equipment. Many of those roadbeds have to be consolidated and rebuilt. That is a civil engineering project analogous to the I-highway system.

One day soon I would hope we can go to electrification, and thus render ourselves independent of imported OPEC oil used in a diesel locomotive. An electrified train makes its own electricity right on the tracks. That could mean a revolution in the manufacture and transmission of electricity in this country and also give us some nice opportunities for offpeak use. So there is a whole forward and backward synergistic possibility in passenger rail.

When I am asked how we do it, all I have to do is look at the photographs on the hearing room wall in front of me of our space activities. That was a marvelous combination of public sector/private sector activity. No two things are the same, but I would say if Morgan Stanley & Co. financed the French Tres Grande Vitesse from Paris to Lyon, which they did, it should be no great trick to get them to do the same for a Chicago-Kansas City, or Chicago-St. Louis train. I just plucked those out of the air.

If the Japanese and the French harnessed private sector technology to a public purpose, there is no reason we cannot do it, and if energy-short Japan, with no real indigenous sources of energy, could do it, I do not see why we can't.

The Joint Economic Committee and the Appropriations Subcommittee under our colleague Adam Benjamin have tried to lay out the general contours of what ought to be done. But you and your committee could not have entered the field at a better time because now we get into questions of technology. For example, which high-speed rail technology is right for the United States? The Japanese constructed their Bullet Line by knocking down mountains and filling in valleys, so that it is pretty much on the horizontal axis. The French TGV goes over hill and over dale without a single viaduct or tunnel between Paris and Lyon.

The one obviously is much cheaper to build than the other. The costs of operations differ. I suspect that both will be helpful to different areas in our country, but nobody has really put his mind to it. You come aboard at a singularly climactic time in the history of rail technology.

What about the type of rail technology? Here we have just begun to take a look at magnetic levitation systems. I am delighted that an American company is experimenting with it right now. It is high time. Magnetic levitation may well have an important role to play in the whole complex.

I conclude, Mr. Chairman, by suggesting that not only would the adoption of high speed passenger rail by our country be a great thing for making jobs, for getting us energy independence, for modernizing ourselves, for producing good transportation, but I think it would help the morale of the American people greatly to find that, not just in outer space, but here on Earth we can apply science and technology for the good of all our people.

I think whoever does it, whatever inchoate Baron Haussmann or General Groves is lurking in the weeds ready for the call, he is going to be a heroic figure. Maybe your great committee can help identify these future heroes and get them started on their job.

Thank you very much.

[The prepared statement of Mr. Reuss follows:]

HIGH-SPEED PASSENGER RAIL FOR THE U.S.

Testimony of Chairman Henry S. Reuss of the Joint Economic Committee before the Subcommittee on Transportation Aviation and Materials, of the Committee on Science and Technology. Rayburn Office Building, 9.30 o'clock Monday morning April 5, 1982

Recognizing the need for a balanced transportation system. the world's major industrial nations have continued to build modern passenger rail systems since the end of World War II. The United States, however, has allowed its passenger rail system to deteriorate.

While passenger railroads in the other industrialized nations are continually striving to increase the speed of their trains, passenger train speeds in the U.S. have decreased. The average speed of passenger trains in the U.S. has declined from 75 miles-per-hour in the mid-1950s to a current average of just over 40 miles-per-hour -- slower than the 60 miles-per-hour average of freight trains in France.

There are two primary reasons for the decline of the U.S. passenger rail system, traceable to the years immediately following the end of World War II. One reason is the growth in the use of private automobiles. Development of an excellent highway system, availability of inexpensive fuel, and increasing affluence enabling more people to buy automobiles contributed to a decline in demand for passenger rail.

A second key factor, often overlooked, is the incompatibility of existing U.S. freight and passenger rail operations. In the 1950s, the freight railroads lost their dominant position to competing truck and air freight service. Responding to their declining market share and to poor track conditions, freight railroads switched to longer, heavier, slower trains. This has had a deleterious effect on passenger rail service that must operate on the same tracks.

As a result of very heavy freight trains, track superelevation -- the tilting of track in order for rail cars to negotiate curves safely at high speeds -- has been reduced or eliminated. Also, slow and heavy freight trains damage the rails, causing the high-grade metal to "plasticize" or flake off. This reengineering of the track does not much affect the operation of a 20 mile-per-hour freight train, but it prevents passenger trains from reaching acceptable speeds, since the damaged track causes them to rattle or derail if they don't slow down.

To compensate for slower freight operations, railroads adjusted their track and grade crossing signalling systems. Since it is prohibitively expensive to install signal equipment accommodating both high- and low-speed operations on the same track, passenger train speeds were reduced.

The length of U.S. freight trains often reaches 100-150 cars or more, making them longer than the sidings built for the shorter trains of the past. A passenger train caught behind a slow-moving freight train is unable to pass because the freight train cannot pull into a siding.

Finally, there are 26,000 grade crossings on tracks used by U.S. passenger trains, requiring substantial reductions in train speeds and increasing the risk of collisions.

Fast, efficient passenger rail service cannot be achieved in the present U.S. system -- behind slow freight trains, on bad track that is ruined by heavy freight trains, and along routes that bristle with grade crossings. High-speed passenger rail can only be achieved along separate rights-of-way in heavily-populated corridors limited exclusively to high-speed passenger trains. These high-speed trains are electrified, run on all-new roadbed and track, with no grade crossings whatsoever.

Development of a modern, high-speed passenger rail system can be undertaken quickly and easily in the U.S. because of the availability of proved advanced passenger rail technology. Perhaps the best example is the Shinkansen or "Bullet Train" of Japan. Construction of the first section of the Shinkansen, between Tokyo and Shin Osaka, was completed in 1964. Based on new and advanced technologies the Bullet Trains have an average speed of 100 miles-per-hour, with a top speed of 130 miles-per-hour. A second generation Bullet Train, which has reached speeds of 197 miles-per-hour, has recently begun service. Since 1976 over 120 million people have used the Shinkansen annually, on as many as 275 trains a day. During its 18 years of operation, there has never been a fatality. In 1980 the Shinkansen turned a profit of $1.35 billion. The newest section of the Shinkansen -- the northern extension to Sendai -- is scheduled to begin service on June 23, 1982.

In 1971 the French decided to build a direct high-speed passenger rail line between Paris and Lyons. On September 27, 1981, the "Tres Grande Vitesse" or TGV began operating on the 256-mile route, reaching a top speed of 160 miles-per-hour. (It set a world speed record of 236 miles-per-hour in tests.) The new system has reduced travel time between Paris and Lyons from 3 hours and 48 minutes to 2 hours flat. By 1985, the French plan to have 87 TGV units in operation, including service reducing to four hours the current seven hour trip between Paris and Marseilles.

Due to our past neglect of passenger rail, the U.S. is in the enviable position of being able to import immediately the advanced technological innovations of other nations, avoiding the research costs and long lead-time involved in starting from scratch.

The development of high-speed passenger rail in the U.S. should be a transnational effort. We will supply the labor, the raw materials, the heavy capital equipment. From our friends abroad some of whom we will hear from today, we ask for technical advice, managerial guidance, investment support.

Members of the Japanese Diet and the U.S. Congress are already cooperating through the Japan-U.S. Rail Congress to facilitate the development of U.S. high-speed passenger rail service. Efforts are underway toward a similar pact with the French.

How best to transfer to the U.S. the existing high-speed rail technology is the key question -- one that this Subcommittee can help to answer. Following are some important corollary questions that this hearing should address.

The Japanese have found that the best location for a high-speed train is a densely populated transportation corridor of 100-400 miles, with well-spaced population concentrations at intermediate points. Which U.S. transportation corridors possess the potential for successful development of a high-speed passenger rail line?

Is a particular existing high-speed rail technology more suitable than others for a specific U.S. corridor? For example, the Japanese designed their Shinkansen system with a minimum of gradient and curvature. With straight track and no hills to climb, the Shinkansen has low operating costs, but initial construction costs were higher. The French saved construction money by building their TGV upon the existing topography, avoiding the costs of tunnels and viaducts. But this required that their trains have much more power for hill climbing, resulting in a smaller seating capacity and higher fuel consumption than the Japanese trains. Which of these two technologies is best suited for a high-speed rail line between Portland and Seattle? Between Milwaukee and Chicago? Can those differing technologies be made compatible for eventual linkage of various U.S. high-speed rail segments?

Separate high-speed passenger rail lines would benefit existing freight rail operations, if only by removing competing passenger trains from the present combined freight-passenger system. Could those freight operations realize additional benefits from improved passenger rail technology? Could light, fast freight trains eventually share the high-speed lines?

Although the technology would come from abroad, development of a U.S. high-speed passenger rail system must employ domestic means of production and, therefore, American workers. Could existing industries like automobiles operating at lowered capacity retool for the production of new track, rolling stock, and electrification systems needed to redevelop our rail system? Can we ensure an adequate market so that a U.S. high-speed rail industry would flourish? Would new industries develop and, if so, would they locate in economically depressed areas?

How can we provide the training necessary to produce workers with the skills required for these new industries? Could programs be instituted to retrain skilled workers who are currently unemployed?

The construction and operation of a high-speed passenger rail system, like any project of such magnitude, would involve the taking of substantial initial financial risk by private business. What role should the federal government take in helping to ensure adequate financing for the new rail system? Are federal loan guarantees feasible?

Finally, rail technology more advanced than the Shinkansen and the TGV is on the horizon. The West German and Japanese governments are already investing in the trains of tomorrow -- magnetic levitation or maglev systems, wherein the moving train never touches the track, but rides on a cushion of air and is propelled by magnetic force. In December, 1979, at the Miyazaki Test Track in southern Japan, a prototype magnetically levitated vehicle reached a speed of 321 miles-per-hour. The Budd Company, the only remaining U.S. manufacturer of rail passenger cars, is presently marketing a maglev system developed in West Germany. Are such maglevs suitable for use in the U.S., and where? Should Congress encourage joint development and domestic production of the maglevs?

These are just some of the questions raised in the effort to develop a U.S. high-speed passenger rail system. This committee can lead the way in providing the answers.

Mr. GLICKMAN. Thank you, Henry, for that excellent statement.

We have been joined by Congressman Winn, my colleague from Kansas, who is the ranking minority member on this committee. I am delighted to have him here. He represents the Kansas City area and, I'm sure, is interested in that high speed corridor from Chicago to Kansas City.

I would like to ask you a couple of questions.

I have heard a reindustrialized rail system applied in several ways. One would be applied all over the country, where we would have a series of transcontinental high speed rail routes. I don't even think you would call them corridors. They would be national highways, essentially. Three or four routes east and west, three or four routes north and south, which would be predominantly freight in orientation, although passenger too. It would truly be a national freight system, accelerated fast freight system.

You mentioned today the corridor option, dedicated passenger corridors in the United States, which I assume would be in all the basic high density population areas. I have seen those on the Amtrak list periodically.

At this stage, has the Joint Economic Committee made any specific recommendation about where this high speed rail reindustrialization should occur, for both passenger and freight?

Mr. REUSS. Yes. The Joint Economic Committee, as its name suggests, bears down heavily on economy. We are struck by the fact that, if you want to make the operation economically self-sufficient, free of subsidy, repaid at the fare box, you probably have to stick to the 20 leading 200- or 300-mile corridors because that is where the traffic is.

That is not to say that it may not be a perfectly fine use of public funds to subsidize, moderately at least, long-run passenger trains like Chicago to Seattle, Chicago through Kansas City to Los Angeles, and so on. But we have not been able to find that those would be economic.

Second, we view passenger rail as a method of incidentally compelling the revival of freight rail throughout the country. That is to say, if you are going to electrify passenger rail, for obvious, sensible reasons, automatically you should also electrify the freight track which presumably is running 15 feet away from the passenger track. Your catenary trollies can serve both purposes. Your whole complex of electric power generation would serve both and has to be figured out and planned on a phased national basis. So you gear in these various steps at about the same time.

Equally, if you start eliminating some of the 40,000 grade crossings—deadly things—on our passenger rail lines, the same feat of civil engineering may do it for the next door freight rail. So, slowly and insidiously, the improvement of passenger rail could do a lot for freight rail too.

Mr. GLICKMAN. What about a cost figure? Have you put any numbers down in terms of how much it would cost, let's say, to put high speed rail corridors in 20 markets in this country?

Mr. REUSS. That really depends, Mr. Chairman, on detailed studies of each of the corridors. Then you add them up.

Fortunately, Amtrak and FRA are doing that, and we can't second-guess them. We are going to wait for them.

I would say, however, that whatever the cost, we do know from the French and Japanese that high speed passenger rail in the proper corridors is completely cost-effective and results in zero subsidy and in the repayment of capital costs. That is what we are interested in. We think it can be done, and I know enough about financial markets to know that, if there is a plan in being, backed perhaps by some kind of a relatively costless Government guarantee, private capital would flow just as private capital flowed to Morgan Stanley to build the French Tres Grande Vitesse.

Mr. **GLICKMAN**. Is Morgan Stanley a U.S.-based investment house?

Mr. **REUSS**. Yes.

Mr. **GLICKMAN**. They essentially financed the French TGV?

Mr. **REUSS**. They were a large part of the syndicate. They glommed onto many an American dollar to do part of that. Far from objecting, I think that is fine. The world is better off.

The American investors are clipping a nice coupon as a result of it. It simply shows if we could get Morgan Stanley to look homeward, angel, we could do it here.

Mr. **GLICKMAN**. Thank you.

Mr. Winn?

Mr. **WINN**. Thank you, Mr. Chairman.

One of the problems, we talk about the corridors and I am sure we would have to follow the corridors that we have laid out at the present time because the minute you start trying to form very many new ones, then the environmentalists will start slowing down that operation or trying to block it in many cases.

The railroad beds out our way are in very, very bad shape. They are maintained much like roads are maintained in Washington. We just fill the potholes and throw the asphalt in the holes and let the cars tamp it down rather than pack it the right way.

I was interested in your statement there about a relatively costless Government guarantee.

Henry, I don't quite understand what that is.

Mr. **REUSS**. Yes, I should make clear what I mean. I am talking about a Government guarantee which, it is reasonably clear, will never have to be called, but which by its very existence reduces the amount of money the bond issuer has to pay. It would reduce the amount of interest from—and we hope that when we get around to doing this the figures will be less than the current figures—an outrageous 15 percent to a much less outrageous 11 percent, let us say.

Let's take the Chicago-Kansas City corridor. Everything you have said about the sorry condition of those lines is true and is replicated throughout the country.

I believe there are seven main rail lines between Chicago and Kansas City. I would think it would be wise to pick the best—that with the least curves, the least traffic congestion—and make that the base of your high-speed passenger corridor. This is the most wonderful adaptive re-use of what you might call a historic landmark—the Atchison, the Milwaukee, and all the other railroads that one could possibly imagine.

Like any other proposition which seeks the favor of private investors, this has to be put together so that it meets with favor when the gimlet eye of Wall Street is applied to it. I believe that could be done. The only way to find out is to try.

It is now being tried in Los Angeles-San Diego.

I would hope that we could move ahead fast enough and on enough corridors so that two conditions could be met: one, so that Wall Street gets in the habit of evaluating these prospects to see whether my proposition is true that a cost-free Government guarantee actually would swing it; and, second, for political reasons.

I can put together a coalition to do 10 or 12 corridors a lot faster than I could put together a group to fix up Chicago to Milwaukee, let us say, or Chicago to Kansas City.

But that is fair. This isn't a boondoggle, a logrolling, or backscratching operation. The fact is, these 20 corridors represent good bets for subsidy-free operation.

Mr. WINN. You are talking about a Government gurantee then. Of course, when the Government steps in to guarantee any of those things, it detracts from the credit of the Federal Government.

Mr. REUSS. That is true. I am not sure that a Government guarantee would be needed.

I am not sure that, with private/public cooperation, you can't put together something which would prove itself as commendable to the private market as the Argentine railroads did 100 years ago.

Mr. WINN. Particularly if the Federal Government decided that this was one of our top priorities. Then I think the private industry and everybody else might come in.

If we don't, if we are lackadaisacal and wishy-washy about what we really want to do—which we have been for quite some time—then I don't know that outside money would become available.

Mr. REUSS. You have said it all, Congressman Winn, right there. What it needs is dynamic leadership, and we have some precedents that I have cited for that kind of leadership. Then who knows? I don't know if you have been up to Harbor Place in Baltimore, 30 miles from here. There is a magnificent thing that was done because an innovative private citizen marshalled the capital, the architecture, the planning, and the know-how. Sensible mayors and governors and other public officials climbed on to help overcome the obstacles, but basically Harbor Place in Baltimore is private.

It isn't a large public park or venture. That same spirit, I think, has to govern our passenger rail. You summed it up very well.

Mr. WINN. Do you think there is any U.S. firm that is capable of building a bullet-type train like they have in Japan and France?

Mr. REUSS. Yes.

Mr. WINN. Many of our railroad builders and contractors have gone out of business.

Mr. REUSS. Yes. The Dunes south of Chicago are full of the sarcophagi of ruined train builders, but there are some left. There's Budd, which I think is going to testify.

There is an important Chicago company which now has some kind of licensing agreement with the foreigners.

I don't exclude bringing in—domesticating—foreign firms to provide jobs and good products here in America. That doesn't bother me in the least, if they are going to hire Americans to do what needs to be done.

For example, I was instrumental in getting Renault of France to come to my State of Wisconsin and make motorcars.

Well, that is better than not having motorcars made in this country. I would think that, with the courageous little start we have in America, with the possibility of getting in foreigners, and with the fact that, just as every time before in history when there has been a demand at the market, things will again, under our system, spring up.

I wouldn't doubt for a moment that great new manufacturers of mag-levs and locomotives and catenary trollies and futuristic communications equipment and articulated cars we can't even dream of would suddenly appear.

That has been true of every great American industry.

Mr. WINN. I think we have a great potential in the motor coach industry which is still doing pretty well in the United States, but—and this is my last question, Mr. Chairman—we have problems that the industry continually faces, the constant battle between labor and management, featherbedding, etc.

My question is if we—if the Federal Government would say this was a No. 1 priority, to rebuild our railroad transportation system, can we be competitive because of those drawbacks?

Mr. REUSS. I will try to give you a very frank answer.

Everybody has to pitch in to make it work and that means our friends in railroad labor. They have been in on these discussions. In fact, they testified at our hearing. In essence, though we didn't bear down too hard on the extra firemen problem and so on, they said: "Look, we want jobs. We won't let antiquated work rules, some of them going back to the days of the industrial revolution, stand in the way of reindustrializing America."

They are patriotic and sensible people, as you well know. I won't attempt to justify all of their practices. What happens though is, when you get desperate and times get bad, then it is human nature to hold onto what you have got by saying nobody shall change my job description. But if you are going into something as radically new as what we are talking about, it is absolutely necessary that labor cooperate. I hope I am not being too optimistic or fatuous, but I believe they would.

Mr. WINN. Thank you very much for your very interesting testimony.

Thank you, Mr. Chairman.

Mr. GLICKMAN. Mr. Dymally?

Mr. DYMALLY. No questions, Mr. Chairman. Just an observation.

I went home this last week to learn that a test run is being contemplated between San Diego and Los Angeles. So I feel this hearing is very timely.

I note with some interest that in New York City, the subway system purchased Japanese trains. Congressman, you were suggesting that perhaps we could build high speed trains here. Yet I understand the U.S. largest manufacturer of cars was unable to fill that New York City order, even though it was just one response to the bid invitation. We had to buy Japan's cars for the New York subway system.

Mr. REUSS. That is a sorry state of affairs, unfortunately. It is the result of our having kicked around our transportation industry so that companies that used to be in that business in America have left it. Only by an upward motion across the board can we bring about a situation where we don't have to go to Japan or Europe to make those cars, but can make them at home.

Mr. **Dymally**. Thank you very much, Mr. Chairman.

Mr. **Glickman**. Thank you. We appreciate your testimony. We would invite you, at your pleasure, to sit with the subcommittee now or during any part of these hearings, if you so desire. We would be honored to have you.

Mr. **Reuss**. Thank you very much. I will return and take you up on that kind offer.

Mr. **Glickman**. Our next witness is Mr. Dagobert Scher. He is assistant general manager for North America of French National Railroads.

We have here, for members of the committee and staff, a beautiful brochure describing the TGV Paris-Lyon test as well as describing the rail system. We are honored to have you here. You may proceed as you wish.

STATEMENT OF DAGOBERT SCHER, ASSISTANT GENERAL MANAGER FOR NORTH AMERICA, FRENCH NATIONAL RAILROADS

Mr. **Scher**. Thank you very much.

First of all, let me thank you for having invited my company before this subcommittee and giving us the opportunity to talk about the achievements that we have made in the field of high speed rail transportation.

Before starting my presentation, I would like to make two remarks. First it is not my intention here to make a comparison between the American and the French system. Obviously our economic political, geographical, social systems are quite different. Therefore, there is no real comparison possible.

Second, I do not intend either to tell you what the United States ought to do to have a comparable rail system as we do, because I am sure that you have the know-how and the day you will feel that it is necessary in this country, you will find a way to do it.

I shall, therefore, limit my remarks to the French railroads' experience in France and within the French economic system.

As it is often said, a picture is worth 1,000 words, and short of having the possibility of taking you all to France, showing you the TGV first-hand, the best I could do was to bring in a short video cassette that lasts about 2½ minutes.

It will give you at least a feeling for what we are talking about.

Mr. **Glickman**. That would be fine.

Mr. **Scher**. Many of the shots actually were made during the world speed records.

Mr. **Glickman**. I think we are going to have to cut the lights. I would ask our friends from television to do that.

[Video tape presentation.]

Mr. **Scher**. You have just seen the result of a project which we started in 1967 when we looked into different ways of solving a problem of saturation which we had on our main trunkline Paris to Lyon.

We looked at many alternatives, one of which was actually to build a high speed line to help the problem of saturation. This project was endorsed by a Government-appointed task force which agreed with us that we should build a fully dedicated line in an area which serves about 40 percent of the entire population of France.

This new line is shorter than the old one by about 55 miles. It has no tunnels. It has a limited number of bridges. It uses extremely steep gradient and is of a standard gauge so as to enable the new TGV trains to run on existing lines beyond Lyon and to also penetrate into the metropolitan areas of Paris and Lyon on existing tracks, and thus avoid the costly operation of construction inside urban areas.

The new line is designed for speeds of 200 miles per hour. It has obviously no grade crossings. It is fenced in all the way. It is electrified with overhead catenary, industrial current of 25,000 volt, 50 cycles. We took particular care to safeguard the environment. We had problems with environmentalists. Much of the work was carried out by local contractors so as to produce jobs in the areas which were involved in the construction.

At the same time we started on the roadbed, we ordered 87 train sets, each of those trains, as you may have seen, consists of 8 cars offering a total of 386 seats with 2 power units, 1 at each end, and often—we run these trains with 2 sets attached to each other, as you have also seen on the screen.

Although this train ran at 236 miles per hour on February 26, 1981, in commercial operation, maximum speed is limited to 165 miles per hour because our study has shown that it is the economic optimum between the amount of energy consumed and the time that you save.

There are no revolutionary techniques in the TGV. We used in the new high speed line only tested and proven technologies. The total cost of the new line including land acquisition, roadbed, track, laying work, signalling, electrification, and the purchase of the 87 trains amounted to $1.5 billion on the basis of the present exchange rate of about 6 francs to 1 dollar.

Contrary to what many people in this country seem to think, this project was entirely financed by the French national railroads without any Government subsidy or any money coming from the taxpayer.

The funds required came from—one-third from the normal depreciation allowance, that is to say from self-financing of the company, and from loans which we floated both in France and on foreign markets, some of which actually were in the United States.

The entire project was part of the normal railroad investment program and it never exceeded 20 percent of our yearly investment.

Furthermore, at $4 million a mile, the new line was really cheaper to construct than would have been a highway of equivalent capacity on that line.

In terms of energy, per passenger, TGV consumes about 107 miles per gallon with a 65 percent load or—the way we like to express it—is that 10 second-class passengers cover the energy costs of a TGV run from Paris to Lyon.

Our service started in September—on September 27, 1981 with 13 daily runs each way to Lyon, 2 to Geneva, and 3 to Dijon.

The trip to Lyon, which used to take 4 hours, has been reduced to 2 hours and 40 minutes, but presently we have only opened the two-thirds southern section which is about 177 miles out of a total of 265.

In the fall of 1983, the remaining northern section will also open to operation and at that time the trip will be reduced even further down to 2 hours. So actually from 4 to 2 hours.

We require that people have a seat reservation on the TGV train. Travelers have a choice of either first- or second-class, and this was extremely important because we did not want to limit that train to the wealthy or to the businessman. It was a train that we wanted everyone in the country to be able to afford.

In first-class, passengers at mealtime have the option of purchasing hot meals served at their seat, exactly like in an airplane, while second-class passengers have to go to a bar car, which is located in the middle of the train and where they can buy snacks and beverages.

Price wise, the fare is exactly the same as it is on conventional trains. That is to say, in first-class to Lyon, it costs $57; in second-class, $38, and only during peak hours do we require a surcharge. It is not a surcharge due to the high speed; it is a surcharge for peak hours.

The TGV has now been in operation roughly 6 months and the results have exceeded our expectation.

We have already carried 2.5 million passengers since September. Roughly we carry 15,000 passengers a day on the TGV and 20,000 on Fridays, a weekly total that varies between 115,000 and 120,000, compared to 77,000 the first week of the operation.

Out of this total 5,000 to 7,000 passengers are absolutely new passengers; 1,000 to 1,500 coming from airlines, the rest coming from the road.

The occupancy ratio is 68 percent. We expected 65 percent after 1 year of operation.

The TGV train runs at high speed to Lyon, but it continues on conventional track to Geneva. At the end of May, when enough trains will have been delivered, we shall also run them down to Marseille, to the south of France, to Nimes and to other southern cities.

In 1983 we are going to extend them to the Alps, to Grenoble and to Lausanne in Switzerland.

Already we have plans for a second high speed line. That one will serve Brittany and the southwest of France. It is called the TGV Atlantique and this project has been considered at the request of President Mitterrand and approved by the Board of Directors of French National Railroads at the beginning of this year.

It will consist of a 219-mile high speed track entirely dedicated to passenger service as the Paris-Lyon line. It will link Paris to LaRochelle, to Bordeaux, by connecting also to the existing tracks and it will also link Brittany.

This line, when it will be completed, would shorten the trip to Brittany, which now takes 5.5 hours, down to 4.

It will reduce the trip to Bordeaux, which is already one of the fastest on the French National Railroads from 4 to 3, and it will reduce the trip to Tour in the chateaux country from 2 hours to 1 hour.

Since the area served is not as rugged as the one served on the Paris-Lyon line, gradients will not be as steep and therefore we intend to run the TGV trains on this new line with extra cars, 10 cars instead of 8 thus offering 484 seats instead of 386.

The cost will be slightly less than the Paris-Lyon line. It will not be, however, financed entirely by French National Railroads as the first high speed line, but probably will be paid out by public as well as private funds.

We anticipate that this project will produce 10,000 new jobs and further reduce consumption of energy.

If the Government, which now has this file under study, gives its approval, and we hope the approval will come before March 1983, the first phase of this project will become operational in 1988.

So, as you see, Mr. Chairman, France has placed its trust in rail transportation for the future as a way to conserve energy, to fulfill the needs of its population, and to create jobs. By adopting proven conventional methods of rail transportation for developing speed as high as 200 and even 250 miles per hour, it opens the door to 21st Century travel at minimum costs. This is the first step.

I am sure others will follow. Thank you very much.

[The prepared statement of Mr. Scher follows:]

FRENCH NATIONAL RAILROADS EXPERIENCE WITH HIGH-SPEED PASSENGER RAIL TRANSPORTATION

Presentation by Dagobert M. Scher,
Assistant General Manager for North America of French National Railroads
At A Hearing on Advanced Rail Technology and the Future of American Transportation
held by the Science and Technology Subcommittee
on Transportation, Aviation and Materials,
Washington, D.C., April 5, 1982

I. Background

FRENCH NATIONAL RAILROADS, or S.N.C.F., as it is known in France, is a company whose purpose is to operate the railroads for both the government and the private owners. It was created in 1937 by executive order through the merger of six railroad companies, with the state taking over 51% of the shares.

FRENCH NATIONAL RAILROADS operates a 21,500 mile system of which 6300 miles are electrified, but these electrified lines handle 80% of all the railroad traffic.

FRENCH NATIONAL RAILROADS employs over 250,000 people and in 1980, registered operating revenue of $6.4 billion (based on an exchange rate of 6 FF to the dollar).

Since passenger traffic alone contributes to 42% of the revenues, it plays an important role in the investment policy of the company. In terms of traffic, French Railroad handled 34 billion passenger-miles in 1980, a 1.7% increase over 1979, and a 34% increase over 1970, in other words, a traffic which represents close to 700 million people carried annually.

These few figures explain the reason why FRENCH NATIONAL RAILROADS developed high-speed passenger service. This development was conducted in two stages:

a - by upgrading existing facilities to make better use of what was available;

b - by building dedicated passenger high-speed lines.

II. The Upgrading of Existing Facilities

FRENCH NATIONAL RAILROADS high-speed program goes back to 1955 when two French-built electric locomotives ran at 206 mph, a world-record speed, to find out what were the optimum capabilities of conventional rail transportation. Based upon the results, work to upgrade speed was carried out upon the two basic components of the railroad:

a - on the roadbed: by improving track characteristics and maintenance procedures, by installing automatic signalling and by electrifying high-density lines;

b - on the equipment: by developing rolling stock and locomotives capable of running smoothly, safely and reliably at high speeds, first at 100 mph and later on at 125 mph.

All these improvements were achieved by railroad staff, within the railroad operating budget as part of the research and development program of FRENCH NATIONAL RAILROADS.

As early as 1967, and for the first time in Europe, daily passenger train service at 125 mph was introduced between Paris and Toulouse, a 446-mile trip which was thus shortened by 40 minutes. Since public acceptance was immediate, shortly thereafter, a similar 125 mph service was inaugurated to Bordeaux, a 363-mile trip covered in four hours with two intermediate stops.

This program was later extended to non-electrified lines by using turbotrains; Paris - Cherbourg, a 150-mile trip, was shortened by 1/2 hour, and Lyon - Bordeaux, a 400-mile trip, was shortened by 1 1/2 hours.

What was learned from this experience with high speeds?

a - that the cost of running a train at 125 mph instead of 100 mph only increases by 10%;

b - that high speed contributes to an increase in traffic.

To determine the effect of frequency upon traffic, a test was conducted between Paris and Caen on the Paris to Cherbourg line by increasing the number of daily trains to ten. The result was very positive: traffic went up from 2.1 million passengers annually in 1970 to 3.9 million in 1978, an average annual increase of 8%.

III. The Building of Dedicated Passenger High-Speed Lines

Construction of a new dedicated passenger high-speed line was contemplated back in 1967 when FRENCH NATIONAL RAILROADS was considering ways of alleviating the problem of saturation which existed on the main trunk line - Paris to Lyon.

Several alternatives had been studied:

a - to increase the number of existing tracks;

b - to reroute freight traffic in order to leave the main line to passengers exclusively;

c - to construct a new high-speed passenger line.

We opted for the latter solution. The proposal was submitted to an independant task force appointed by the government, and which included airline and highway representatives. It came out in favor of this project in 1969, with plans to run turbine-powered high-speed trains. But nothing much occurred until the first energy crisis caught the world by surprise in 1973. The government then reappointed a new committee to review the proposed new high-speed line, this time based upon electrically-powered trains. This committee drew similar conclusions as the first one. So, in March of 1974, the French Cabinet approved the project and declared the construction of a new high-speed rail line between Paris and Lyon of public necessity. Actual construction started in December of 1976.

The main purpose of this line is to improve rail service through Southeastern France by relieving the present line which was handling 250 trains a day and by speeding up feeder connections. It has an impact on an area where 40% of the total French population lives.

The dedication of the new line to passenger service exclusively allows the use of steep gradients (up to 3.5%). It also results in shortening of the route: 265 miles from Paris to Lyon instead of 320 miles for the old line. It eliminates the need for tunnels, reduces the number of required bridges, and thus brings down the cost of the infrastructure by 30%.

Since the line is of standard gauge, TGV trains may also run on existing lines beyond Lyon, and penetration into the metropolitan areas of Paris and Lyon on existing tracks is possible, therefore avoiding excessive construction costs around urban areas. Unlike the Japanese TOKAIDO line, which is separate from the conventional network, the French high-speed line is directly connected to the existing one. TGV trains will not only link Paris to Lyon but travel to Marseille, Grenoble, and even as far as Switzerland.

The new line is especially designed to high-speed standards, for speeds of 200 mph with .43 degree curves. It is electrified with overhead catenaries using industrial current of 25 kV, single phase, 50 cps.

For obvious safety reasons, there are no level crossings, and the line is fenced in all the way.

In addition, signalling is provided directly in the engineer's cab with an automatic speed monitoring system while train locations are monitored from a central control station located in Paris.

Regional contracting firms took part in the infrastructural work as contractors, subcontractors and suppliers. An estimated 20 to 25% of the work was carried out by local contractors. Thus, the development of this project had significant repercussions on the economic activity of the areas involved.

Also, great care was taken to safeguard the environment. Environmental impact studies were prepared, and several routes were considered with the cooperation of the Ministries of Agriculture, Culture, and Environment, while sensitive areas were the subject of special architectural and landscaping studies.

IV. Equipment

FRENCH NATIONAL RAILROADS ordered 87 train sets in 1976 of which about 50 have already been delivered and perform daily high-speed service.

Each train set is composed of eight (8) passenger cars plus two (2) power units, one at each end, capable of developing 8560 hp under 25 kV.

Each train offers 386 seats in coach-type seating arrangement: 111 seats in first-class and 275 in second-class. Two train sets may be coupled together and run with one locomotive crew (one man in the cab) for a total seating capacity of 772.

Although on February 26, 1981, FRENCH NATIONAL RAILROADS ran its TGV on the new line at the world-record speed of 236 mph, maximum speed in commercial operation is limited to 165 mph, which is the economic optimum between energy consumption and time saved.

Despite such high speeds, TGV trains exert only limited stresses on the track as the load borne by each axle does not exceed 17 tons. Thus, it remains well below the value encountered on conventional equipment: 20 tons in Europe and 30 tons in the U.S.A.

V. Cost

The total cost of the new line, including land acquisitions, roadbed, track laying work, signalling, electrification and the purchase of 87 train sets, amounted to about $1.5 billion (at the exchange rate of 6 FF to the dollar), of which $420 million was spent for the laying of 250 miles of double track and 25 miles of single track made up of welded rails fixed on reinforced concrete sleepers. It also included 100 track switches, the entire electrification, communications, signalling, the fencing in of the line and all building construction. The cost of 87 trains amounted to $675 million, and the balance went for land acquisition and the infrastructure (general earth work and bridges).

The financing for this project was entirely covered by FRENCH NATIONAL RAILROADS without any government funds. It was part of the railroad's normal investment program, that is to say with self-financing out of the depreciation allowance and loans floated in France as well as in other countries. The only government involvement was to guarantee the loans floated by the railroads and yet with a yearly limit. Contrary to what was sometimes erroneously reported by the media, in no way did the government or the taxpayer subsidize the construction of the new French high-speed line.

It is also important to note that:

-FRENCH NATIONAL RAILROADS investments for its high-speed line were never made at the expense of the existing network. In fact, they represented only a portion of total railroad investments and never more than 20% for a given year.

-Cost overruns remained within 5% of estimates.

-The new high-speed line was cheaper to construct than a highway of equivalent capacity ($4 million a mile). The maximum capacity of the new line is 20,000 passengers per hour.

-The financial rate of return for FRENCH NATIONAL RAILROADS is 17% while the economic rate of return for the nation is 33%.

VI. Energy and Ecology

TGV trains are highly energy efficient. Per passenger, their energy consumption is slightly less than that of a conventional train running at 100 mph.

With a 65% occupancy ratio, the TGV consumes per passenger about 1/5 the energy of an Airbus plane and less than 1/4 that of a subcompact car. In fact, per passenger, the energy consumption of a TGV train is about that of a motorbike or 107 miles per gallon.

This can be expressed in another way: 10 second-class passengers cover the energy cost of a whole TGV train run between Paris and Lyon.

TGV trains run on electricity. Thus, they make extensive use of French domestic energy resources in the form of hydraulic and nuclear energy instead of imported oil. In addition, this form of energy is non-polluting.

The noise level of TGV trains at 165 mph is lower than that of conventional trains.

VII. Service

On September 27, 1981, the southern two-thirds section of the new line, or 177 miles, opened to commercial operation with a total of 18 daily TGV trains each way (13 to Lyon, 2 to Geneva, and 3 to Dijon). On Fridays, FRENCH NATIONAL RAILROADS offers 23 trains each way. The Paris to Lyon stretch, which before the high-speed line required four hours, can now be covered in 2:40 hours at maximum speeds of 165 mph. In the fall of 1983, when work on the remaining northern section will be completed, the trip will be reduced even further: to two hours exactly.

At present, TGV trains depart Paris and Lyon every hour. More frequent departures are planned at a later date.

No standees are accepted on TGV trains. Seat reservations are compulsory and to that effect, automatic reservation machines have been installed on station platforms to make reservation possible up to five minutes before train departure.

Interior seating is designed somewhat like that of an airplane with four people abreast in second-class and three in first-class.

There is no formal dining car on board, but first-class passengers can obtain hot meals at their seats while second-class passengers may find meals at a bar located in the middle of the train. The bar also sells cigarettes, newspapers and magazines.

VIII. Fares

With TGV trains, FRENCH NATIONAL RAILROADS did not aim to create a luxury service intended for business travellers or first-class passengers only, but it tried to provide frequent high-speed service for everyone.

The fare is that of conventional trains in first-class as well as in second-class. Only during peak hours is a surcharge levied. To use the airline terminology, the TGV is not "a high contribution train." In 1982, the 265-mile trip to Lyon costs $57.00 in first-class and $38.00 in second-class, which comes to about 21 1/2 cents per mile in first-class and 14.3 cents per mile in second-class.

It is the first time in transportation history that from the outset, advanced technology is made available to all consumers at current price levels.

IX. Results

Based upon studies conducted prior to the construction of the new high-speed line, FRENCH NATIONAL RAILROADS anticipates that passenger traffic between Paris and Lyon, presently 15 million people a year, will reach 20 million by 1985. In addition, it is expected that there will be a shift from private automobiles and airplanes to the railroads: three million a year from automobiles and 1.5 million a year from airplanes by 1985.

The first results obtained after only a few months of operation are extremely encouraging:

- Traffic has grown from 77,400 passengers in the first week of operation to over 115,000 a week today.

- The one-millioneth passenger was carried on November 21, 1981, less than two months after the opening of the line.

- FRENCH NATIONAL RAILROADS carries about 15,000 passengers daily and over 20,000 on Fridays by TGV.

- 32% of all passengers use first-class.

- Everyday, there are about 5000-7000 new passengers compared to the year before. About 1000 of these passengers are former air travellers.

- The occupancy ratio is 68% on the new line. Since a 65% ratio was the objective after one year of operation, this means that the new high-speed line has well exceeded all expectations.

- On time performance is 97.9%.

X. Plans for the Future

Last February 1982, at the request of President MITTERAND, the FRENCH NATIONAL RAILROADS submitted to its Board of Directors a proposal for the construction of a second high-speed line, this one to serve Brittany and the southwest of France. It is to be known as the "TGV ATLANTIQUE." This project will be reviewed by the government and could become a reality as early as 1988.

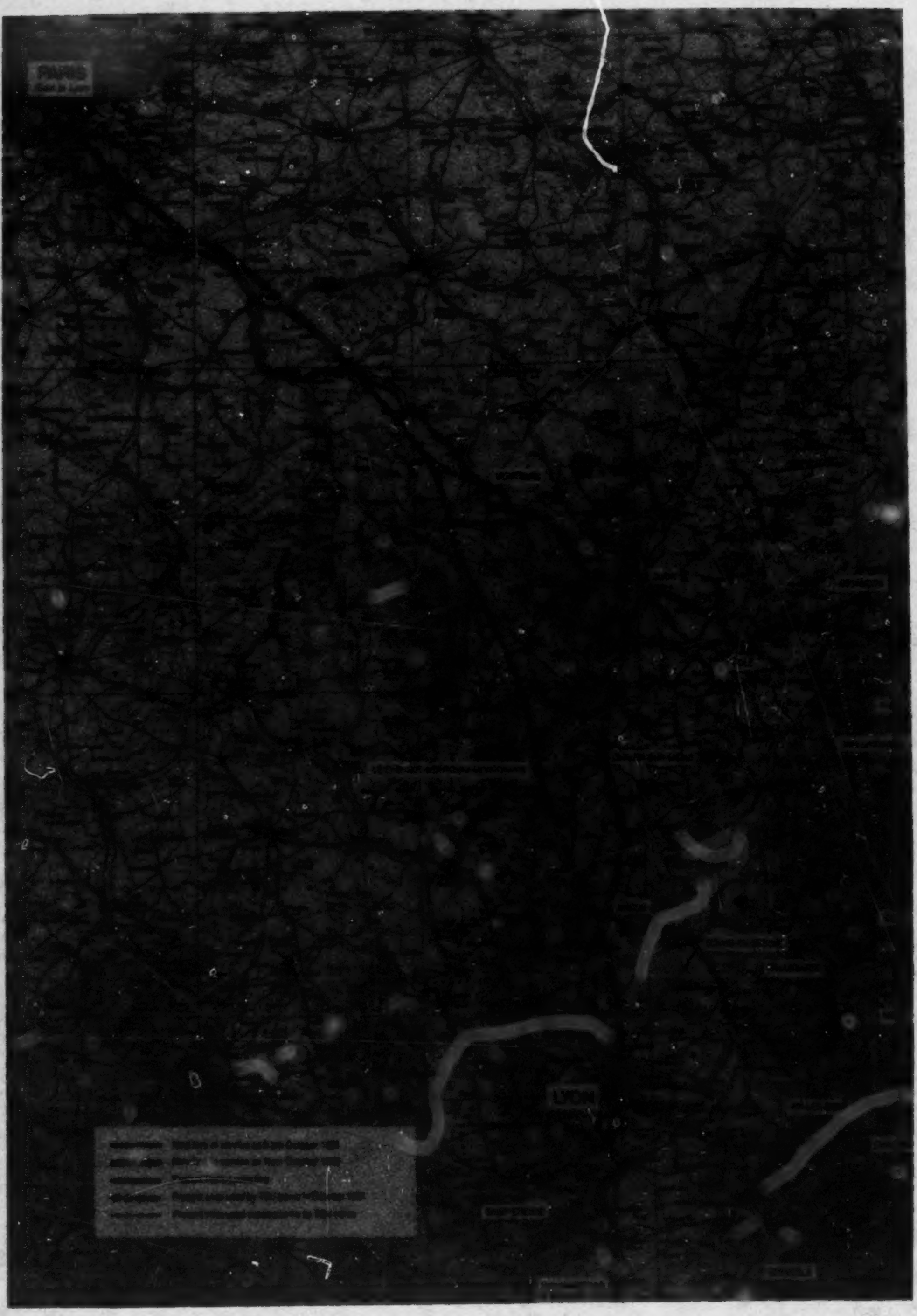
The "TGV ATLANTIQUE" would consist of a 219-mile dedicated passenger high-speed line which would connect Paris to existing tracks south of Tours and west of Le Mans.

When completed, TGV trains will link Paris to Tours in one hour (instead of two hours), Paris to Nantes in two hours (instead of 3:17 hours), Paris to Bordeaux in three hours (instead of four hours), and Paris to Brittany in four hours (instead of 5:39 hours).

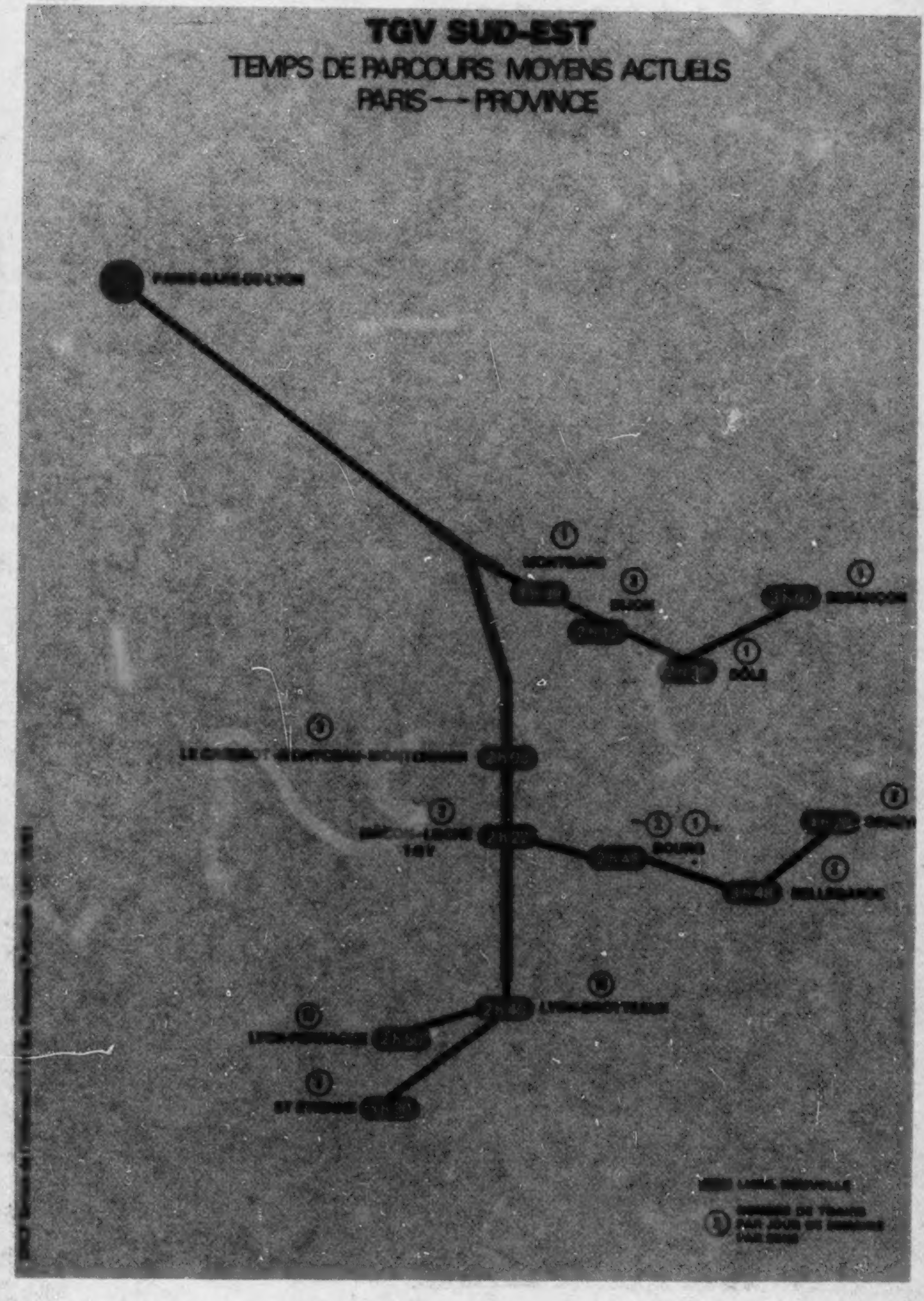
Since the area the "TGV ATLANTIQUE" would serve is not as rugged as that of the Paris to Lyon high-speed line, gradients would not have to be as steep, and therefore, each TGV train will haul two extra cars, increasing the number of available seats from 386 to 484.

The cost is estimated to be slightly less than that of the Paris-Lyon line. It would create about 10,000 new jobs and further reduce energy consumption on the national level. But, while the Paris-Lyon line was entirely financed by FRENCH NATIONAL RAILROADS, the "TGV ATLANTIQUE" is expected to be paid for by public and private funds.

It thus appears that the trust France has always placed in its rail system has proven to be well deserved. Once again, its technology is ahead of its time and with its TGV train, it sets the pace for 21st century rail travel with tremendous economic benefits to the Nation and its people.



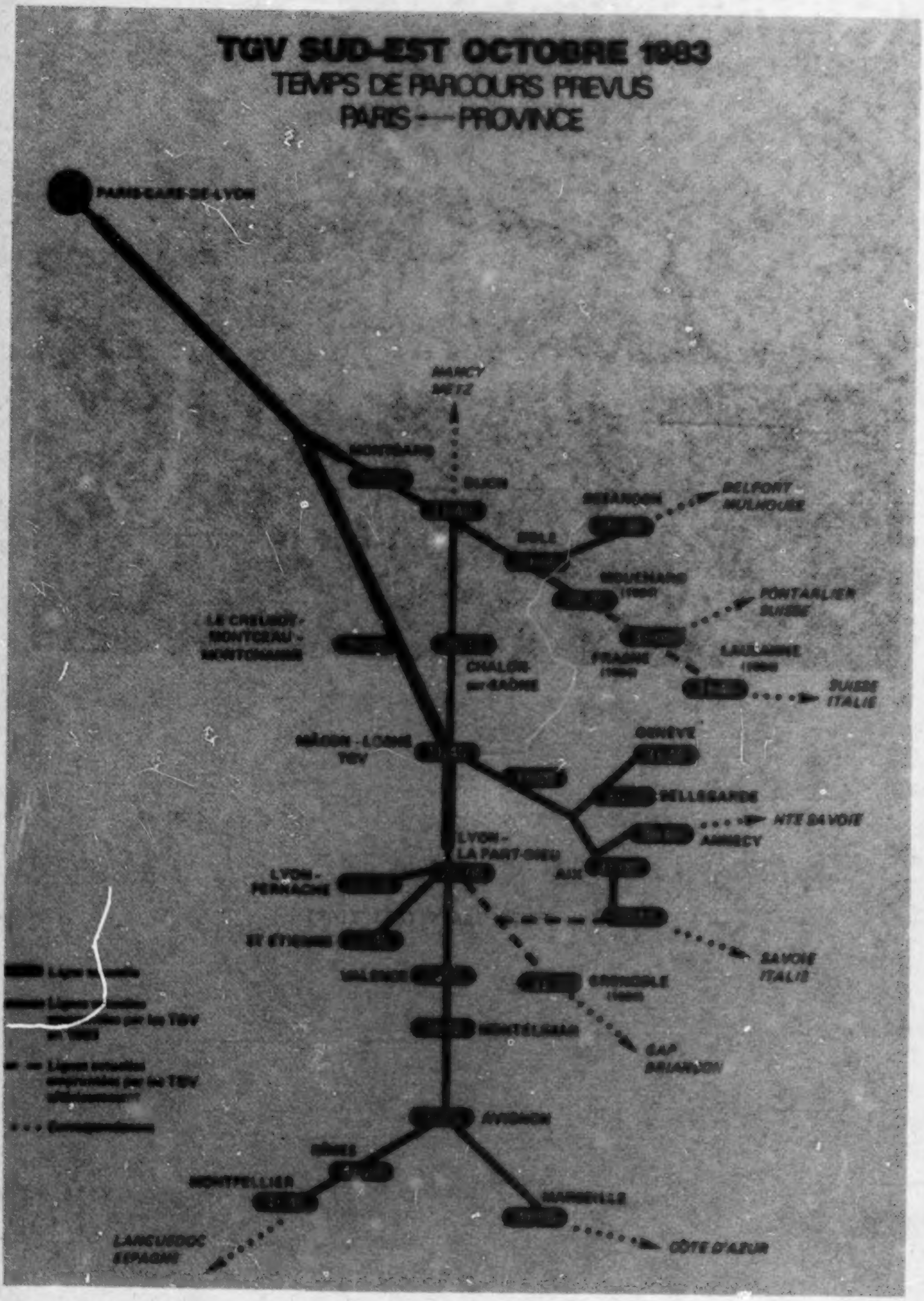
MAP OF THE NEW TGV HIGH SPEED LINE



HIGH SPEED LINE:

NUMBER OF DAILY SERVICES SINCE SEPTEMBER 1981

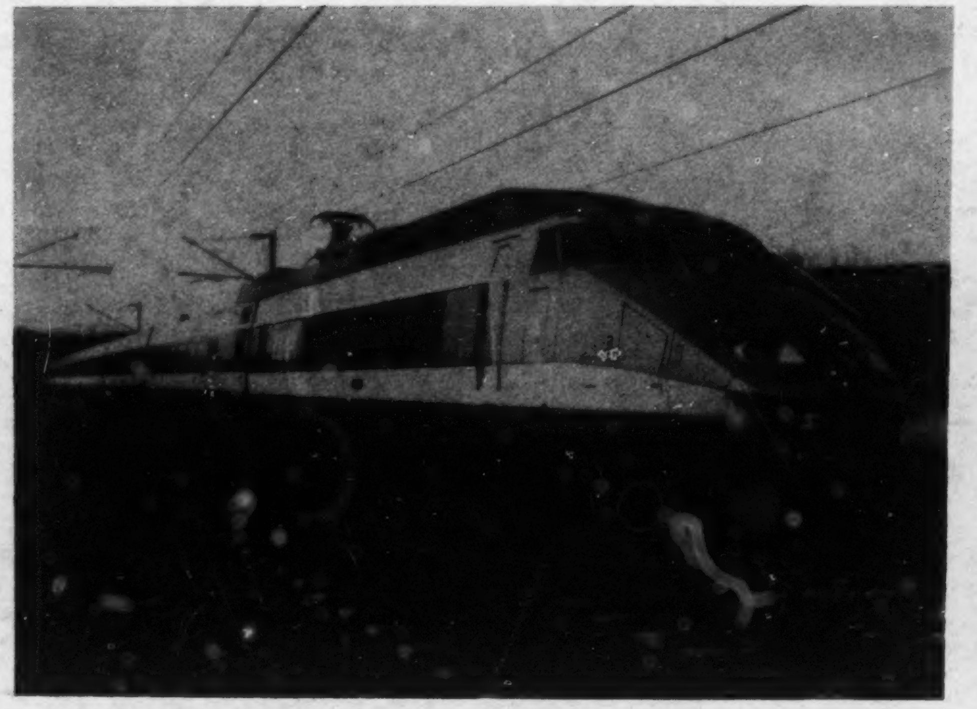
AND LENGTH OF TRIP



HIGH SPEED LINE:

SERVICES IN OPERATION IN OCTOBER 1983

AND LENGTH OF TRIP



TGV HIGH SPEED TRAIN (EXTERIOR)

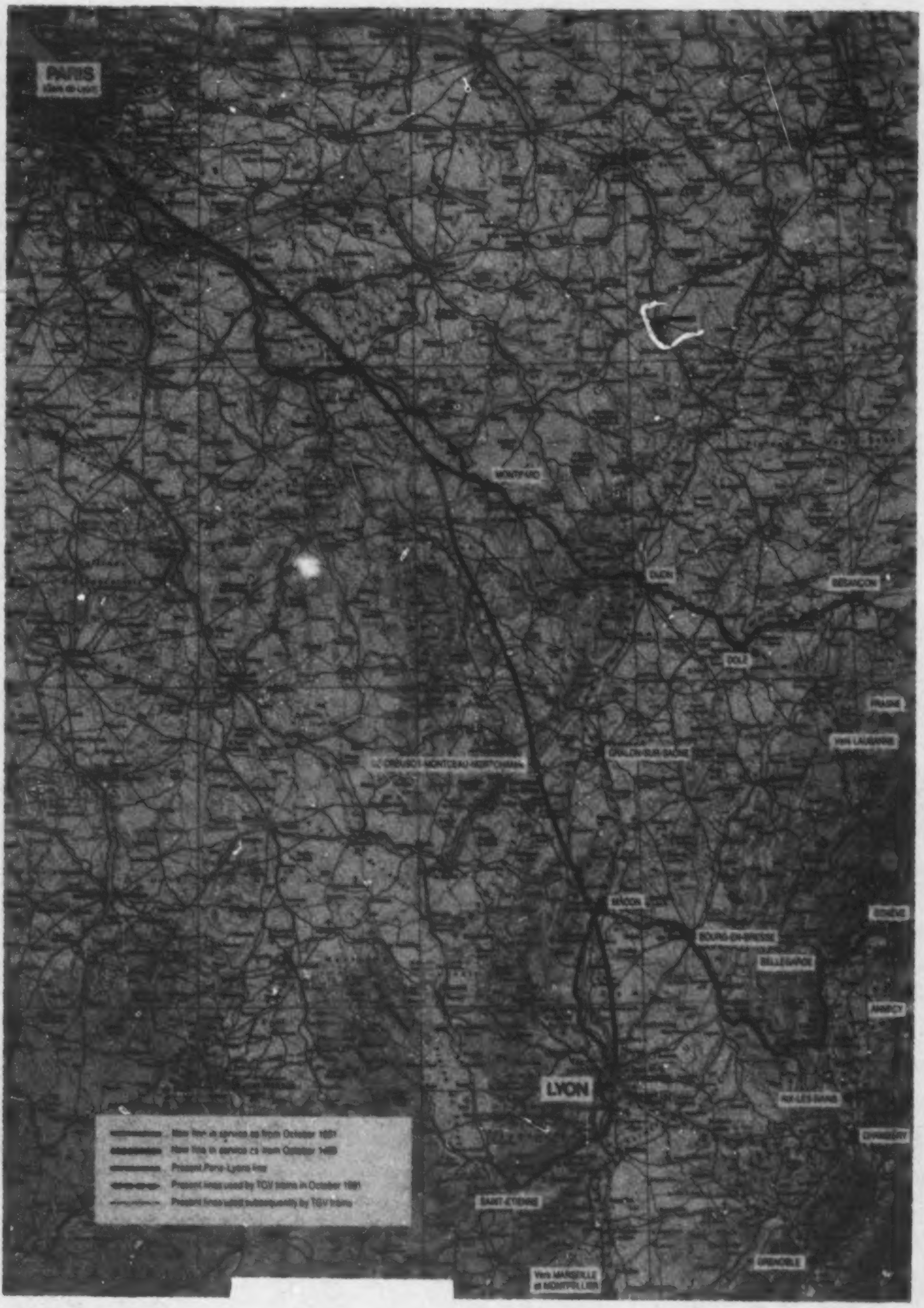
TGV TRAINS IN THE PARIS STATION

TGV HIGH SPEED TRAIN (1ST CLASS INTERIOR)

TGV HIGH SPEED TRAIN (BAR CAR)

The TGV
Paris-Sud-Est

SNCF


PARIS
Gare de Lyon
MONTBARD
DIJON
BESANÇON
DOLE
FRASNE
Vers LAUSANNE
CHALON-SUR-SAÔNE
LE CREUSOT-MONTCEAU-MONTCHANIN
MÂCON
BOURG-EN-BRESSE
BELLEGARDE
GENÈVE
ANNECY
AIX-LES-BAINS
CHAMBÉRY
LYON
SAINT-ÉTIENNE
GRENOBLE
Vers MARSEILLE et MONTPELLIER
New line in service as from October 1981
New line in service as from October 1983
Present Paris-Lyons line
Present lines used by TGV trains in October 1981
Present lines used subsequently by TGV trains

A NEW ERA

Setting a world speed record on February 26, 1981

On February 26, 1981, one of the TGV high-speed train sets, running at 380 km/h (237,5 m.p.h.) on one of the already completed sections of the new Paris-Southeast line, enabled French Railways (SNCF) to break the unchallenged world speed record which it had itself established 26 years ago. In March 1955 two locomotives the BB 9004 and CC 7107 both hauling a three-car test train had reached 331 km/h (205 m.p.h).

This technical achievement remarkable at that time opened the way to new research which was to give the railway, over the years the possibility to strengthen its competetive position in the passenger transport market. No immediate commercial applications were however possible until 1967 when a high-speed train, the « Capitole », began to provide regular daily service on conventional tracks at 200 km/h (125 m.p.h.) between Paris and Toulouse. Four years later, the « Aquitaine » and the « Étendard » and, more recently, a Corail train (1st and 2nd class), the « Montaigne », also went into service at this speed. The record set on February 26, 1981 represents the success of a complete system with a harmonious combination of rolling stock, track and electric traction installations, foreshadowing an era of high-speed railway travel whose beginnings are now imminent. Running at 380 km/h, (237,5 m.p.h.) the TGV train set No. 16 — identical in every respect to the standard construction unit showed vividly of the railway's capability to handle future passenger traffic with absolute safety and with the best in standard of comfort. As early as of next autumn, millions of passengers will yearly be using the new line and place their trust in one of the finest achievements of French industry.

TGV at the Gare de Lyon station in Paris.

The Paris-Lyon-Mediterranean line is one of the main arteries of the French national railway network on which the traffic, which covers almost 40 % of France's population, has progressed much faster than on the other lines of the SNCF.

However, on long sections of the present Paris-Dijon line, there are only two tracks, whereas four are required.

These sections constitute virtual bottlenecks which, when traffic exceeds 260 trains per day, bring about saturation which is highly detrimental to railway operation.

In addition, the simultaneous movement of passenger and freight trains on the same track slows down the traffic and reduces the regularity of its flow.

A solution thus had to be found, and this brought out the need :

- to set up a new line dedicated exclusively for passenger service;
- to design very modern rolling stock, the high-speed train.

To ensure optimum project profitability and to provide the community with the best service, it was also found necessary :

- to integrate the new line entirely within the existing network so as to enable high-speed trains to continue their route over present infrastructures toward the main cities of southeastern France, thereby offering remodelled services without requiring costly additional capital investments;
- to make the TGV accessible to all railway customers — second as well as first class — in order to guarantee truly « equal rights » to speed.

TGV on new line.

■ A line dedicated exclusively to passenger service

With its conventional standard-gauge track, the new line will leave the present Paris-Lyon line at Combs-la-Ville, in the Paris suburban area, to join again with the existing infrastructures at Sathonay in the northern Lyon suburbs.

Its lay out, 390 km (244 miles) long, will shorten the distance between Paris and Dijon by 29 km (18 miles) and between Paris and Lyon by 90 km (56 miles).

Directly connected to the existing network, it will enable TGV trains to serve the heart of the cities and to continue their run beyond Dijon, Mâcon and Lyon, without losing any of the benefits of the time saved on the high-speed infrastructure.

Thus, Burgundy, Franche-Comté, Savoy, upper Savoy, Lausanne and Geneva will benefit just as much as Lyon from the high speed of the TGV. Further south, Saint-Étienne, Grenoble, the Rhône valley, Marseille and Montpellier will reap the benefits of a basically remodelled service.

Specially designed for high speeds, the new line, electrified with industrial current at 25-kV single-phase, 50 Hz will be provided with a reinforced but nevertheless conventional infrastructure : entirely welded rails of 60 kg/m, concrete sleepers, very thick ballast, switches and crossings which can be passed at high speed, curves of 4 000-m radius. For obvious safety reasons, there will be no level crossings.

TGV negotiating a ramp.

Thanks to their power — 6 300 kW — and to a large proportion of driving axles, the TGV trains will be capable of negotiating at full speed very steep gradients (3.5 %) similar to those encountered on mountain lines. It has thus been possible to avoid the construction of tunnels and to reduce the cost of infrastructures by almost 30 %.

Train safety will be assured by an entirely new system which will make no more use of conventional signals usually set up along the tracks. All information relating to train operation, transmitted through track circuits and picked up by sensors on the power cars, will be displayed in the driver's cab itself. Consequently, the driver will be informed at all times of the speed he will have to maintain and his reactions will be checked by an automatic driver's alertness control devices. In addition, radio-telephone equipment will enable him to stay in constant communication with the central traffic control station.

Construction work on the new line began in 1976 and has been progressing on schedule.

Thus, in the first quarter of 1981, the infrastructure work (earthworks, bridges and other structures) has been practically completed on the southern section (Saint-Florentin-Sathonay) scheduled to go into service in the autumn of 1981.

TGV

Tracklaying on the new line.

Unreeling the catenary.

Points allowing high-speed switching.

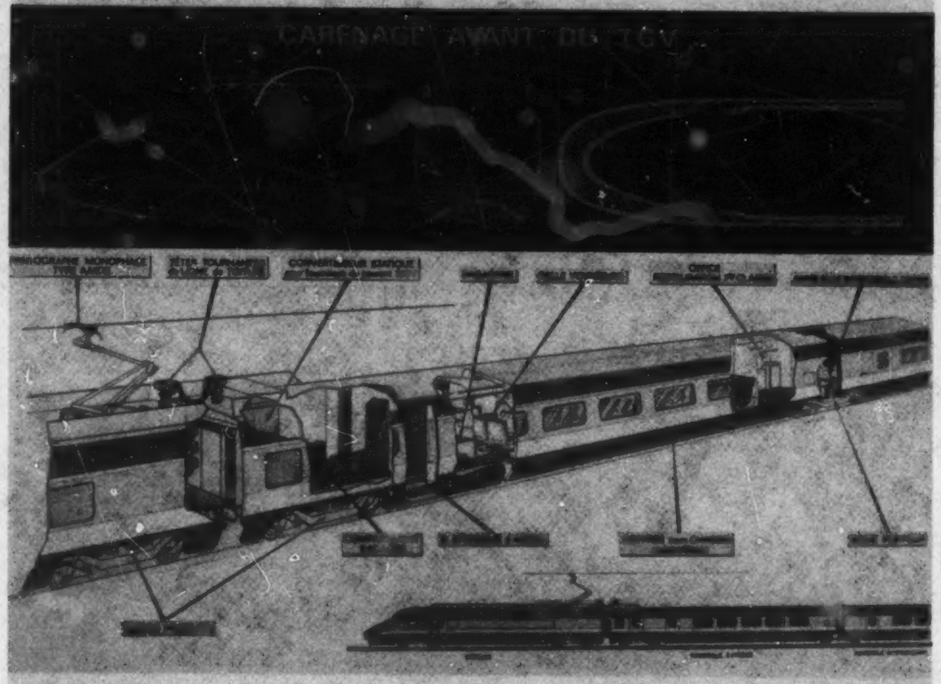
On the northern section (Combs-la-Ville — Saint-Florentin), not scheduled to go into service until October 1983, the work had already progressed substantially.

The superstructure work — track laying, signalling and catenaries — has been moving along steadily on the southern section since the second half of 1979 from yards in Montchanin, Saint-Florentin and Sathonay.

The construction of the new line has made it possible to use local contracting firms for many tasks : thus, building of the new station at le Creusot-Montceau-Montchanin was entrusted to a company in Chalon-sur-Saône and at Mâcon to a company in Gueugnon.

Concerted action has also been undertaken as concerns the population living along the new line. A special bulletin entitled « TGV Information » is published every four months and provides information on work progress as well as on the temporary disturbances which the work might bring about. In addition, many operations relative to the regrouping of farmlands, involving over 34 000 hectares, were successfully carried out in connection with the construction of the new line.

Nose of TGV (computer autopilot)



View of 1st class and trailer car of TGV

- **Very modern rolling stock**

It was on March 24, 1972 that the first prototype, the TGV 001, of the future trains sets intented for the new line left the factory. Promptly following prototype tests made it possible after a few months to reach the speed of 318 km/h (198,7 m.p.h.).

Orders for standard production trains-sets were placed four years later, in 1976. The 87 units ordered offered the French railway industry an exceptional market both as regards its production volume and the high technology involved.

The TGV high-speed train, which benefits from state-of-the-art achievements, in fact constitutes the most complete synthesis of the possibilities of railway technology.

In order to serve, from the new line, all the major links of the existing network, the TGV train-sets are provided with electrical equipment enabling them to use 25-kV, single-phase, 50-Hz current as well as 1.5 kV dc. Six train-sets will even have additional equipment for 15-kV, single-phase, 16 2/3 Hz current enabling them to serve Lausanne.

In spite of their speed, they will exert only limited stresses on the track : the load borne by each axle does not exceed 17 tons and thus remains well below the values usually encountered on conventional electric locomotives (21 to 23 tons) or modern freight car (20 tons).

TGV

2nd class interior.

1st class interior

Driver's cab.

Made up of two power cars and eight intermediate trailer cars, each train will have a seating capacity for 386 passengers (275 second-class seats and 111 first-class seats). Two train sets can be coupled to offer a capacity of over 750 passengers.

The maximum speed in commercial service has been set at 260 km/h (162,5 m.p.h.), a limit which can presently be regarded as an economic optimum.

The construction of the rolling stock was entrusted to Alsthom-Atlantique and GIE Francorail. Many production plants throughout France have been kept active :

- in Belfort : manufacture of power cars (bodies and equipment assembly) by Alsthom-Atlantique;
- in Reichshoffen : construction of end trailer cars by Francorail (de Dietrich);
- in Aytré-La-Rochelle : manufacture of intermediate trailer cars by Alsthom-Atlantique;
- in Creusot : manufacture of bogies by Francorail (Creusot-Loire);
- finally in Tarbes : manufacture of traction motors, power converters electric gear and electric equipment by Alsthom-Atlantique and in la Plaine Saint-Denis, Champagne-sur-Seine and Lyon, for the whole of traction equipment, by Francorail (Jeumont-Schneider).

A TRAIN FOR EVERYONE

Montpellier

TGV leaving Lyon-Perrache station.

Besançon

Avignon

The TGV, which will make high-speed travel available to everyone, will not be a transport mode restricted to a privileged minority : all passengers, second-class as well as first-class, will be able to use the service with fares very similar to those of the present lines. However, on the most frequently used connections, with trains operating during rush hours or periods of heavy traffic, passengers will pay an extra fare similar in its principle to the one presently applied on some trains running on particularly busy lines. It is the first time in transport history that advanced technology will be made available from the outset to such a large number of customers.

The SNCF consequently expects the new line to bring about a considerable increase in the traffic between Paris and Lyon : in 1985, it expects to carry 22 million passengers as compared with 5.5 million in 1955 and 12.6 in 1975.

Evolution of traffic on Paris-Lyon line

Millions of passengers annually

1955	*1965*	*1975*	*1985 (Forecasts)*
5.5	*9.5*	*12.6*	*22*

- **Numerous connections**

As they are put into service, the TGV train-sets will provide direct service on four major lines :

- *Paris-Burgundy, Franche-Comté, Switzerland,* Ski resorts of Savoie and Dauphiné regions.

Lake Annecy

Geneva

Marseille

- *Paris - Rhône-Alpes,*
- *Paris - Savoy and Switzerland,*
- *Paris - Rhône Valley, Provence and Languedoc.*

By October 1981, the 38 trains in operation will serve not only Lyon, but also Dijon, Besançon, Mâcon, the urban community of le Creusot-Montceau-Montchanin, Saint-Étienne and Geneva. By 1981, Montpellier and Marseille will also benefit from TGV service.

By 1983, the TGV service will be supplemented by trains going to the Savoy region (Chambéry and Annecy) via Mâcon and Bourg, while Lausanne will be served by the beginning of the next year. On the other hand, it will be necessary to wait until the completion of electrification before the service can be extended to Grenoble, the capital of Dauphiné.

The TGV will not only upgrade service to large cities : from its main stations, additional transfer connections will be possible, particularly by means of new « Z2 » electric transit railcars designed to run at 160 km/h (100 m.p.h.). Many medium-sized communities will hence benefit from time savings very similar to those offered in major cities.

During rush hours and weekends, the service provided by the TGV will be backed by conventional trains using the present line.

Model of new
Creusot-Montceau-Montchanin station.

Model of new
Lyon La Part-Dieu station.

Model of Mâcon's TGV station

■ Suitable stations

Since the recent opening of an underground suburban station, the Paris-Lyon surface terminal is used only for main-line traffic. It will offer entirely renovated facilities in the near future.

In Lyon, the urban development work in the Part-Dieu quarter will include the construction of a new station. However, as the Part-Dieu projects will not be completed in October 1981, the Brotteaux station will be used during a transition period of two years before being closed completely to traffic. The Perrache station, for its part, will be served by all the TGV trains, the terminal station of which will be in Lyon.

On the new line itself, two stations reserved exclusively for TGV passengers will be built namely the Creusot-Montceau-Montchanin and the Mâcon stations which will offer large parking facilities. Initiated at the beginning of 1980, the construction work on these stations will be completed by the time the first line section goes into service, in the autumn of 1981.

Finally, the modernization of many existing stations is planned in order to provide improved passenger facilities and easy access to local means of transportation : such is the case in particular of the stations of Lyon-Perrache, Marseille-Saint-Charles, Annecy, Montpellier, Aix-les-Bains, Valence, etc.

Prototypes of TGV ticket machine

Fiches admission T.G.V
Fiches admission T.G.V
Pour votre confort dans le TGV
SNCF
Pour votre confort dans le TGV
SNCF

TGV bar

Specific services

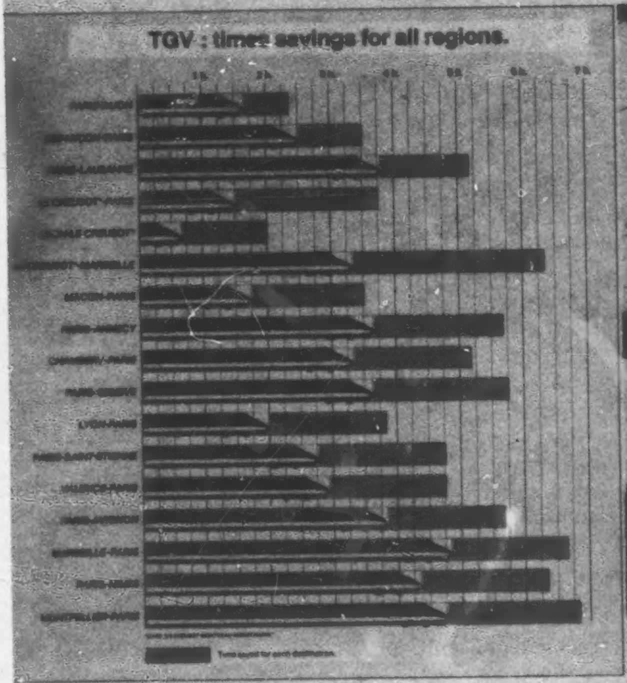
To ensure seating accommodation for all TGV users, passengers will be required to reserve their seats in advance and no standing passengers will be allowed.

Reservations will be possible either, as is presently done, within the two months preceding the trip or, at each TGV station, on the day of the trip and until the last minutes before departure.

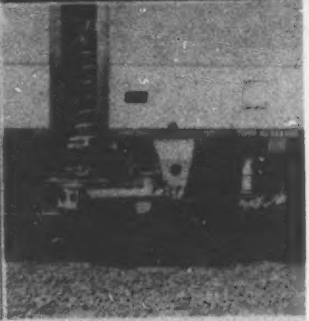
Once on the train, passengers of both classes will enjoy comfortable accommodation thanks to soundproofing and air conditionning. A bar will be installed for all passengers, in addition to the possibility of having meals served in their seats.

MAJOR BENEFITS

Pantograph specially designed for high-speed current collection.


TGV : times savings for all regions.
1 h.
2 h.
3 h.
4 h.
5 h.
6 h.
7 h.
LYON-PARIS
Time saved for each destination.

TGV trains will also serve :
Aix-les-Bains, Bellegarde, Bourg-en-Bresse,
Chalon-sur-Saône, Dole, Frasne, Montbard, Montélimar,
and subsequently : Grenoble, Chambéry, via Lyon.



Carrying bogie
located between cars.

▪ Time saving

Due to the speed of the TGV on the new line (260 km/h) (162,5 m.p.h.), travelling times will be reduced considerably. These times savings will be achieved in two stages :

- *as soon as the southern part of the new line goes into service in October 1981, the Paris-Lyon run will be covered in 2 hours and 40 minutes instead of the 3 hours and 48 minutes taken by the best trains presently using the existing tracks;*
- *in October 1983, when the entire line will be completed, the travelling time will be even further reduced : Paris will then be only 1 hour and 40 minutes from Dijon, 2 hours from Lyon and 4 hours and 5 minutes from Marseille.*

▪ Energy saving

The use of the new line by many passengers who formerly used other means of transportation consuming more energy will produce a significant saving in this field.

The energy consumption of the TGV per « seat-kilometre » is in fact hardly more than that of conventional trains.

Thus, on the Paris-Lyon run, each passenger will consume only the equivalent of 9 litres (2.4 gallons) of premium petrol. Moreover,

Articulation ring allowing movements between cars.

TGV leaving Dijon.

TGV on line of left bank of Rhône Valley between Lyon and Marseille.

thanks to electric traction, the TGV will make extensive use of domestic energy sources, whether of hydraulic or nuclear origin.

▪ Noise limitation

The low interior noise level is an important factor of comfort on the TGV. The bogies are located between the cars. Articulation bellows formerly used and which generated noise and air currents have been replaced by annular connections which eliminate these disturbances entirely.

Owing to their streamlining and their rolling quality, TGV trains running at maximum speed will be less obtrusive from the environmental viewpoint than a conventional train running at 160 km/h.

Precautions have also been taken so that the line always avoids inhabited zones. Going through the rural areas of the Brie, Morvan, Charolais and Bresse regions, the line will in most cases be set up more than 200 metres from the towns.

In addition to being more silent, the TGV with its electric traction system will also not produce atmospheric pollution.

Passage provided for farms

Crossing over a canal
in the Saône-et-Loire region.

Particular care has been given
in every design phase to ensure harmonious
integration of the line
into the environment.

▪ Safeguarding the environment

To protect the environment, the layout initially chosen was modified at several points. Hence, in the Yonne region, the line avoids the Chablis vineyards and the touristic valley of the Serein, and runs along the Tonnerrois plateau over a distance of about 65 km.

TGV

A motorway crossing

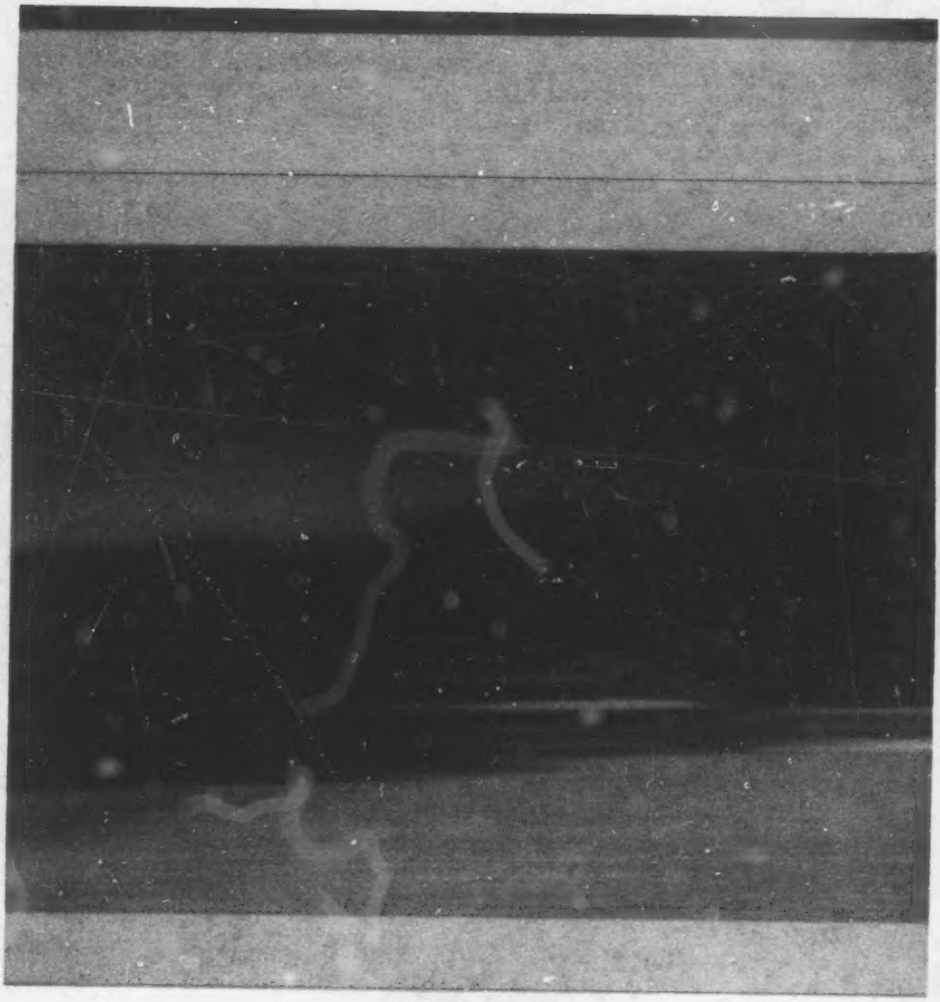
Digoine [illegible]
in the Sa[illegible] region
(this is the longest structure on the line (410 m long).

Arroux viaduct
in the Saône-et-Loire region.

Special passages have been built to allow livestock movements and wildlife migrations wherever civil engineering structures (viaducts, bridges, etc.), used at road or river crossings, were not considered necessary.

To preserve existing flora, hydrogeological studies were carried out so that the subgrade of the line does not disturb the aquifers.

Finally, architectural unity was sought in the design of the 500 or so civil engineering structures (including 320 railway bridges and 176 highway bridges) along the new line. The most important structures, calling for particular care as concerns their integration within the site, were designed with the help of noted architects.



Considerable time savings, improved train frequency, fares similar to those applied on present lines, travelling comfort and safety, energy savings; these are just a few of the factors which will make the *TGV* a major transportation innovation of the close of the century. Its technical and commercial advantages will certainly serve to enhance the reputation and presence of the French railway industry in international markets.

Mr. GLICKMAN. Thank you for your excellent testimony, as well as the videotape and brochures you brought us also.

I would like to ask you a couple of questions regarding the relationship of the French Government to the French National Railroads. Obviously, as you stated in your testimony, the political, economic, and social implications of the industry are different than in this country.

As I understand it, your Government owns 51 percent of your railroad system?

Mr. SCHER. Correct.

Mr. GLICKMAN. Now, does the Government provide direct assistance for research and development?

Mr. SCHER. No. The way it is operated, the railroad's board of directors controls entirely the railroad exactly as any company, private company. We decide on the budget. In that budget we have a research and development program. However, the entire budget, once it is approved by the board of directors, has to be submitted to the Ministry of Finance and the Ministry of Transportation, which can reject or approve it. Usually they approve it.

In fact, no money really comes directly for a specific project out of the Government.

Mr. GLICKMAN. What if you show an operating deficit?

Mr. SCHER. All right. If we show an operating deficit, there are two possibilities that can happen. Up to about 1976 the Government would pay out the difference between the revenue and expenses. And that always gave rise to quite a bit of arguing and discussions.

Since 1976, under the administration of Giscard D'Estaing, what used to be done was that we had to go on the public market and try to cover that with loans which we carried from year to year. So that today we have reached a problem of interest that we have to repay, which creates a great deal of difficulty for the company.

Presently this entire program is being revised by the present administration.

Mr. GLICKMAN. OK. Let me get to the technology of it.

You have basically said that there is really no exotic technology involved in this railroad.

Mr. SCHER. Correct.

Mr. GLICKMAN. That is, everything that you used is technology that is available to anybody in the world?

Mr. SCHER. Correct.

Mr. GLICKMAN. No exotic materials used?

Mr. SCHER. None whatsoever.

Mr. GLICKMAN. Were there any technological advances? For example, I am told you have reduced the unsprung mass with fully suspended traction motors.

Mr. SCHER. All right.

Well, what we are talking here——

Mr. GLICKMAN. Excuse my nontechnological background. What I am trying to get at is what do you have in there that we did not have before?

Mr. SCHER. All right. What that means is that normally on the locomotives your traction motor is attached on the bogie of the train. We took these and attached them on the underframe of the body and with a, how do you call it, a rod similar to your car, we direct that motor to the wheel to create the movement.

So actually the unsprung mass is really because we attached the motor to the frame of the body rather than to the trucks. That is really what it is.

So it is not new technology, it is something that we can do. It is just that we discovered that that was a preferable system to use.

Mr. GLICKMAN. There you were being ingenuous with existing technology?

Mr. SCHER. Exactly.

Mr. GLICKMAN. But in terms of materials?

Mr. SCHER. The materials are the same. You are using track that has a deeper ballast. You are using electrification, which is normal; you are using an articulated train. That is considered, if it is revolutionary, which it is not; you are lowering the body of your cars really like the Talgo train, in Spain. So it is really nothing new in that respect.

Mr. GLICKMAN. And the consumer support has been good?

Mr. SCHER. Tremendous, tremendous.

Mr. GLICKMAN. There is nothing therefore in the technology that could not be adapted to this country or any part of this country?

Mr. SCHER. Exactly.

The only thing, if I may add, is that in order to get that support from the public, you need two things; not only high speed, because if you have high speed and you have only one train a day, nothing happens. You have to have the high speed with the frequency.

People have to have the feeling that when they get to the station they have a shuttle that goes out practically every hour, exactly like the Eastern shuttle here. If you let them stand at the terminal for 2 or 3 hours, you have lost, because the speed you gain is lost by their wait at the railroad station.

Mr. GLICKMAN. We thank you for your excellent testimony.

Mr. Winn?

Mr. WINN. Thank you, Mr. Chairman.

It sounds like scheduling is a very, very important part of your operation.

Mr. SCHER. Definitely.

Actually, as I mentioned in my written statement, in our earlier stages when we were testing 125 miles per hour, we made some tests on a line from Paris to Cherbourg with turbotrains to find out what would happen if we really created frequency, and actually the traffic, within a few years, almost doubled.

So it shows that really the frequency is a very, very important aspect of your operation.

Mr. WINN. Do you think increasing or doubling your normal operation in a very short period of time had to do with fuel prices and automobile costs? Those are double what ours are.

Mr. SCHER. Yes; but they have not moved that much in the past 4 or 5 years. Yes, prices have gone up in France but not as much as you have seen here in this country.

Mr. WINN. You talked about the depreciation even when you get into the financing. You stated that the TGV was financed through depreciation allowance and Government-guaranteed loans. Could you break down the depreciation structure for us?

Mr. SCHER. It was one-third depreciation allowance and two-thirds guaranteed loans.

Mr. WINN. One-third depreciation allowance?

Mr. SCHER. Correct.

Mr. WINN. Two-thirds Government loans?

Mr. SCHER. Government-guaranteed loans.

Mr. WINN. Guarantee, Government guarantee?

Mr. SCHER. Right.

Mr. WINN. In other words, there was no direct new upfront money?

Mr. SCHER. Absolutely not.

Mr. WINN. By the French Government in any way whatsoever?

Mr. SCHER. Absolutely not. We spend $2 billion a year in investments, to renew our equipment, to electrify new lines, to renew our plant. Out of that, roughly 20 percent was used to finance the high-speed line.

Mr. WINN. In your $4 million per-mile construction cost, you said that was less than that for a highway of equivalent capacity. What does this figure include for a usually major cost of the right-of-way acquisition? You said you had some problems too with the environmental groups.

Mr. SCHER. Right; we encountered problems because we went through some national parks, we had to cross certain landmarks, we had to separate some farms in half, so we had to provide for underpasses. So we formed groups which went out to the public with members of the Ministries of Environmental Protection and Culture and Agriculture; we discussed these various matters with local groups and tried to arrive——

Mr. WINN. To see if you could arrive at some agreement on what they would accept?

Mr. SCHER. At some agreement.

Mr. WINN. All of your roadbed is on the surface except for bridges and overpass?

Mr. SCHER. Correct; there are a few bridges and a few viaducts, no tunnels, and that in itself saved about 30 percent of the cost.

Mr. WINN. Basically, that is the terrain of the land, it is fairly flat.

Mr. SCHER. No; it is not. Actually, you have a rather high ramp just as you enter Burgundy. This is where we have a 3½ percent gradient.

Mr. WINN. This is probably a dumb question, but with the high speed, do you have seatbelts available for safety?

Mr. SCHER. No, you do not need it. Actually, this is a very good question because very often I am asked what is your sensation when you ride at that speed? You are disappointed. I have been on that train now five times. The only place where you have any thought of sensation is if you sit in the cab of the engineer and you look at the track coming in, and somebody made a very good remark, he told me this train is "eating tracks" and it is true, this is the impression you get.

When you sit at your seat and look out through the window, you basically do not see anything except at one point you follow a highway and you know that French people drive at very high speed on the highway and you pass them like they were standing still. So now you realize that probably you must be going fast, but otherwise you have absolutely no sensation whatsoever, exactly like when you are on the plane you do not realize you are going 500, 600 miles an hour.

Mr. WINN. Thank you.

Mr. GLICKMAN. I am curious. What percentage of your financing came through the United States?

Mr. SCHER. I honestly could not answer you that question because I do not know what came from the United States, what came from Germany, what came from the other markets. But I know we did float a few loans here in the United States on Wall Street.

Mr. GLICKMAN. OK.

Another question in light of what Mr. Winn asked. I notice your seats are facing backwards.

Mr. SCHER. No, actually, you have both, facing forward and backward and they are fixed. Some people like to be four together so you have them facing each other, some face backward, some face forward. Since the train goes in both directions, you have no way really of knowing how you are going to sit.

Mr. GLICKMAN. A final question. You indicated you were getting some new passengers from cars and some from airplanes. I would hate to see, let's say, a new system displace another means of transportation.

One of the things that intrigues me about high-speed rail in the United States is it could take some pressure off other modes, because some of our airports are becoming saturated. You operate some internal air service, I assume, between Paris and Lyon?

Mr. SCHER. Yes.

Air Inter, which is a domestic local airline.

Mr. GLICKMAN. Have you seen a reduction in the number of people who are flying and an increase in people who are taking the train?

Mr. SCHER. Yes; there has been a decrease in people flying and Air Inter has reduced not really the number of flights but it is using now smaller capacity planes to do that run. Obviously it takes about an hour to go to the airport in Paris, and it takes roughly an hour to come from the airport to Lyon. You have already 2 hours. The trip takes 40, 45 minutes. Nevertheless, you already have there about 2, almost 3 hours. We are now making it in 2 hours, 40 minutes. Plus Lyon has a problem in winter, it is very often foggy in there. So in that respect we are becoming really competitive.

Obviously the energy consumption is quite different from a plane, so it has also helped the energy conservation of the country.

Mr. GLICKMAN. We very much appreciate your testimony today. You have presented us some material in addition to your statement which we appreciate. All of it will be included in the record. We thank you for coming here today.

Mr. SCHER. Thank you very much, Mr. Chairman.

Mr. GLICKMAN. In trying to diversify the witnesses for this kind of a hearing, we decided that we wanted to bring in a potential United States user at this time. We are honored to have the mayor of the city of Las Vegas, Nev., the Honorable William Briare, accompanied by Mr. Mike Daly, economic development coordinator.

We are honored to have you here. Your entire statement will appear in the record. You may summarize.

STATEMENT OF WILLIAM BRIARE, MAYOR, CITY OF LAS VEGAS, ACCOMPANIED BY MIKE DALY, ECONOMIC DEVELOPMENT COORDINATOR

Mr. **Briare**. Thank you very much, Mr. Chairman. A pleasant good morning to you and to the distingushed members of your committee.

For the record, my name is Bill Briare. I have the privilege of being the mayor of the city of Las Vegas and, notwithstanding what your impression might be of one of Las Vegas' more popular attractions, I want you to know that we agree with the distinguished Congressman Reuss that we do not want any losers. The losers we do not want are losers in the future of the train industry in the United States.

When we received your cordial letter inviting us to appear before your committee, it was with the request that we discuss with you a little bit about the program that the city of Las Vegas has established to encourage a high-speed superspeed ground transportation system linking the city of Las Vegas with the city of Los Angeles. This is the corridor, incidentally, which is ranked fourth in the emerging corridor survey referred to a little earlier this morning.

Mr. Daly and I are here today to brief you on what Las Vegas is doing to establish such a system connecting these two cities. I have asked Mr. Daly, the city of Las Vegas economic development director, the project manager for our feasibility study, to make a few remarks following mine.

So that we are all thinking of the same thing at least as far as my comments are concerned, I would like to define what we mean by high speed and what we mean by superspeed. We like to refer to a high-speed passenger train as being a private passenger train riding on a dedicated track for passengers only at speeds up to 130 miles an hour average, and we would like to refer to a superspeed train as a passenger train riding again on a dedicated guideway or track and traveling at speeds that would average from 200 miles to even 250 miles per hour or more.

We have had the privilege over the last 2 years, the most frequent of which was just 2 months ago, to ride the TGV train just so vividly described for you, and I have also ridden the Japanese Shinkhansen train from Tokyo to Osaka. And the most interesting I think was the Maglev train that we inspected and rode in on a demonstration model in Kassel, West Germany.

Congressman Winn, I rode in the cab of this TGV and the sensation is—if you like to fly airplanes—that you could pull back on the stick and, with the track coming at you at flying speed, you could actually take off.

Also, another interesting comment I have not included is the fact that Luftstanza Airlines in West Germany have actully purchased and is going to have a train in order to save on a couple of routes on their national flight schedules. This is because of the greater convenience of a train to get their passengers from one point to another as opposed to flying an airplane.

Also, I want to relate to you a comment that was made in a good-natured way in one of our newspapers in Las Vegas where they said that the mayor of Las Vegas apparrently was deprived as a child of having an electric train because he seems to be so enthusiastic about the potential of our country in high-speed ground transportation.

Well, the fact of the matter is, Mr. Chairman, I did have an electric train, a little different scale than what we are talking about now, but I think I represent the interests of many people throughout the country, and especially in the community of Las Vegas where we have had nearly 100 percent support to work on this project that we have been working on.

Last Wedneday was a particularly exciting day because it was the day of an announcement of the Amtrak's subsidiary called the American High Speed Rail Corp. to accommodate investment interests throughout the United States to find ways and means to finance some of the projects that are being discussed before your committee today.

Second, the news of a high-speed train connecting San Diego and Los Angeles, which is the No. 1 corridor in the "emerging corridors" ranking, was good news to us because it dovetails very nicely with the plans that we have to connect the city of Los Angeles with the city of Las Vegas.

What happened practically overnight is a potential interface between these two trains. It increased the market potential for the city of Las Vegas by not only the large metropolitan Los Angeles area, but now the large population of San Diego, from which we could derive potential passengers.

Also, on Wednesday the city of Las Vegas made a selection from a number of highly competitive consultants, as to who was going to do our high speed train feasibility study. The day after tomorrow that contract will be negotiated.

I am confident that you and the members of the committee and everyone else in Washington who is interested are going to be hearing a lot more about interstate and intercity travel on high-speed corridors. It is a big project. It has a long, long-term benefit to it.

The wall decor in this room has already been referred to; it is an indication of the superiority of the United States in space technology. We are way ahead of every country in the world in most technical fields. It is hard for me to believe that we lag behind countries in Europe and Asia in developing these highly developed transportation systems.

Our country must face the reality that by creating a new intercity transportation system we will be reducing the need for building, repairing and maintaining bigger and more costly highways, while reducing our dependence on foreign and domestic oil.

Of course, building these freeways and highways takes a tremendous amount of petroleum products. This month's Reader's Digest tells of a story about the desperate need of repair in which our trillion-dollar highway system finds itself throughout the country. The U.S. Department of Transportation warns that at least half of our 3.9 million miles of highways are in serious need of repair.

A new high-speed ground transportation system throughout the country and in the emerging corridors in particular would create jobs, protect our environment as far as air and noise quality are concerned, and reduce certain traffic congestion. I believe it would be a boon, Mr. Chairman, for the Nation's tourism industry, which is the largest industry in the free world. I believe that the attitude of our Nation is leaning toward the acceptance of alternative modes of travel other than gasoline-demanding automobiles, buses, and airplanes.

There is a saying that a journey of a thousand miles begins with the first step, and we can achieve this modern transportation system network that we are talking about and that others are going to be talking about before your committee if we take it on a step-by-step approach, and we believe Las Vegas is embarked enthusiastically on that first step.

This month the city of Las Vegas begins its feasibility study. We expect it to be compieted in October. The contract is for $300,000 and Mr. Daly is going to describve that to you a little bit more.

I did want to point out to you that the funds to pay for this study were derived from a $150,000 grant from the Department of Transportation and the balance was raised by the Nevada Department of Transportation, the city of Las Vegas, the county of Clark—which is our county—and the Las Vegas Convention and Visitors Authority.

Local citizens and representatives of our business and political community have been involved in the review process in the preproposal days, the proposal review which was concluded last week and the proposed implementation plans which will be forthcoming by the consultant in the months to come.

We are encouraged by the participation of representatives from the Federal Railroad Administration, the city of Las Vegas and its supporting communities and from the State of California Department of Transportation officials in the southern California area.

This study will produce a financing plan, a design plan, an implementation plan, and an operating plan. Las Vegas has begun an ambitious project. The first step is always the hardest, but we have taken that step. We predict a great increase in ridership if high-speed trains will replace the trains that are in existence today. Furthermore, the interest in the United States is going to continue to grow and you will feel it as the days go on.

Later this month we plan to participate in a conference that is being held in Houston, Tex., to discuss interstate ground transportation between the Sun Belt States.

Thank you, Mr. Chairman and subcommittee members.

Mr. Daly would like to address a few remarks to you following which we would be delighted to answer questions.

[The prepared statements of Mr. Briare and Mr. Daly follow:]

TESTIMONY

GIVEN BY

WILLIAM H. BRIARE

MAYOR OF LAS VEGAS

Congressman Glickman and distinguished members of the House Subcommittee on Transportation.

My name is Bill Briare and I have the privilege of being the Mayor of Las Vegas, Nevada.

When I received Congressman Glickman's cordial letter inviting me to appear at these hearings, he indicated that you were particularly interested in the City of Las Vegas' program to establish a high-speed/super-speed ground transportation system linking Las Vegas with Los Angeles. I must say that I am very pleased to be able to be here today to brief you on what Las Vegas is doing to establish a high- or super-speed ground transportation system to link Southern Nevada with Southern California. I have asked Mike Daly, the City of Las Vegas Economic Development Director and Project Manager of our city's "Train" Feasibility Study, to also address you following my brief remarks.

Let me begin by saying that the high-speed/super-speed ground transportation system, envisioned for the Las Vegas-Los Angeles corridor, could be the most exciting, the most courageous, the most innovative ground transportation system in the history of the United States. The effort required to establish such a system will undoubtedly rival the commitment and effort our nation has devoted to the space program, the building of our interstate highway system, the satellite communications system, and other major national development projects. If the will of Congress and the President could be directed toward a futuristic plan for surface transportation using very modern technology, as America did with aerospace science, we will solve the dilemma of intercity transportation.

For the purpose of definition in this statement, trains are classified mainly into three groups, including:

1. "Existing trains" in passenger use are most of those now operating in the United States at very slow speeds. These trains burn diesel oil and share tracks with freight trains.
2. "High-speed trains" are those which travel on conventional type rails dedicated primarily for passenger use and, if high-speed design allows, secondarily for freight. These trains are run by electricity and have the capability of speeds up to 165 miles per hour. However, they can be expected to average 125 miles per hour for distances of 500 miles or less.
3. "Super-speed trains" are those which travel faster than 165 miles per hour and can exceed 300 miles per hour. They travel on a rail, guideway, or other appropriate device. They are propelled by electromagnetic levitation or some other as-yet-to-be-developed system capable of propelling a vehicle carrying 300 to 500 passengers or more.

Four countries are noted for their high-speed train technology, France, Great Britain, Japan, and West Germany. The following chart provides details on available "state-of-the-art" systems worldwide:

HIGH-SPEED/SUPER SPEED GROUND TRANSPORTATION SYSTEMS

AVAILABLE TECHNOLOGY

Designation	TGV[1]	ETR401	Series[2] 961	HST[3]	LRC	APT[4]	ET403	Metro-liner	Maglev
Country	France	Italy	Japan	England	Canada	England	Germany	USA	Germany/ Japan
Maximum Speed	228MPH	150MPH	160MPH	125MPH	125MPH	150MPH	135MPH	160MPH	250/300
Operating Speed	160MPH	125MPH	130MPH	100MPH	100MPH	125MPH	125MPH	120MPH	Advanced testing stage
Propulsion System	Electric	Electric	Electric	Diesel Electric	Diesel Electric	Electric	Electric	Electric	Electro-Magnetic

[1] Tres Grande Vitesse

[2] Shinkhansen "Bullet Train"

[3] High-speed Train

[4] Advanced Passenger Train

SOURCE: The Budd Company

The technology for the high-speed/super-speed ground transportation system proposed for the Las Vegas-Los Angeles corridor has developed to the "super-speed" age.

I believe you will share my thoughts that the United States, far ahead of every country in the world in almost every technical field, should not lag behind countries in Europe and Asia in developing these super-modern ground transportation systems.

We must face the reality that by modernizing our intercity transportation system, we are reducing our need for building, repairing, and maintaining bigger and more costly highways and reducing our need for finite fuel supplies, whether from domestic or foreign sources. Such a system also creates jobs, protects our environment, particularly in terms of air and noise quality and in terms of reducing traffic congestion, as well as fostering our tourism industry, the largest industry in the free world. Moreover, the attitude of our nation is leaning toward accepting alternative modes of travel other than cars, buses, and airplanes.

We could cite numerous statistics relative to travel and tourism to demonstrate how much travel and tourism contribute an enormous infusion of capital into the United States economy. In the United States, travel and tourism is a multi-billion dollar industry the largest employer in 23 states, and the third largest retail industry in the United States. Travel in 1980, for example, generated:

4.5 million tourism jobs

2.2 million supporting jobs

$34.4 billion in payroll income

$16.4 billion federal, state, and local tax revenues

1.4 million component companies involved (99 percent classified as small businesses)

$157 billion spent in the United States ($147 billion by Americans; $10 billion by foreign visitors)

1981 was the first year in which foreign visitors to the United States outnumbered Americans going abroad.

Some wise person once said: "A journey of 1,000 miles begins with the first step." We can achieve this modern transportation if we begin now with a step-by-step approach. And Las Vegas has embarked enthusiastically on this journey. In this month of April, the City of Las Vegas begins a feasibility study which will culminate at the beginning of October.

As a measure of the extent to which high-speed/super-speed ground transportation technology is available, we are pleased to indicate to you which contractors and participating companies responded to the City of Las Vegas Request for Proposal on the City's "Train Feasibility Study."

Prior to offering the contract to the Budd Company, the City held a pre-bid proposal meeting at which there were 58 United States and international firms represented. We just completed the bid-review process in which 13 companies representing some 50 firms submitted proposals to conduct the study. This bid-review process consisted of three separate review teams (the City's Administrative Review Team and the Technical Advisory Committee and the Study Management Task Force) analyzing the proposals, narrowing the proposals to 5 finalists, and then offering the contract to the successful proposer. The contractors included:

BOOZ.ALLEN.HAMILTON INC.
Riverside Research Institute
T.K. Dyer, Inc.
Transtech International, Inc.
Marketing Research & Development, Inc.
Kercheval and Associates

THE BUDD COMPANY (from West Germany)
Bechtel
Transtech International, Inc.
Transrapid International
Deconsult

DALTON.DALTON.NEWPORT
G. C. Wallace, Consulting Engineers, Inc.
International Engineering, Inc.
Peat, Marwick, Mitchell & Company
Rail Systems Center, Carnegie-Mellon University
Unified Industries, Inc.

DELEUW, CATHER & COMPANY
SRI International
Coopers & Lybrand
The Planning Group, Inc.

GANNETT FLEMING/NEVADA ARCHITRONICS
Mark Battle Associates
Transportation Specialists
Westec Services, Inc.

JAPANESE RAILWAY TECHNOLOGY CORPORATION (from Japan)
(Japanese National Railways)
No participating firms

LESTER B. KNIGHT & ASSOCIATES, INC./
RECREATION PLANNING ASSOCIATES, LTD. (from Canada)
Urban Transportation Development Corporation/UTDC (USA) Inc.
Canadian Institute of Guided Ground Transportation

THE MITRE CORPORATION
No participating firms

PLANNING RESEARCH CORPORATION/SOCIETE FRANCAISE D'ETUDES
ET DE REALISATIONS FERRAVIAIRES (PRC/SOFRERAIL) (from France)
No participating firms

STEER DAVIES & GLEAVE LTD.
The Henderson Busby Partnership
Japan Transportation Consultants Inc.
Skidmore, Owings & Merrill
Information Management Ltd.

TRANSMODE, INC./UNIVERSITY OF NEVADA, LAS VEGAS (from Great Britain)
(Transmark-British Railways)

TRANSPORTATION AND DISTRIBUTION ASSOCIATES, INC. (TAD)
DAY AND ZIMMERMAN, INC.
Gellman Research Associates
E.F. Hutton

WILBUR SMITH AND ASSOCIATES
Sverdrup & Parcel and Associates
Gibbs & Hill, Inc.
Boyle Engineering Corporation

Mike Daly will describe this feasibility study for you shortly. I am especially gratified to be able to report to you, that the Las Vegas study has had the enthusiastic support of the entire Las Vegas community from its inception. The funds raised locally to match the $150,000.00 grant from the United States Department of Transportation for the $300,000.00 study comprise funds from the Nevada Department of Transportation, The Las Vegas Convention and Visitors Authority, from Clark County, and, of course, from the City of Las Vegas.

Local citizens and representatives of the Southern Nevada business community, including representatives of the Downtown Progress Association, the Nevada Resort Association, and local government representatives have been involved in the review process during the pre-proposal, proposal review, and proposal implementation phases of the feasibility study. And we are encouraged by participation of representatives from the Federal Railway Administration, the City of Los Angeles and its surrounding communities, and from the State of California "Caltrans" officials involved in Southern California ground transportation.

In the Las Vegas-Los Angeles high-speed/super-speed ground transportation system feasibility study, our local and state governments have developed a partnership with the private sector, which inevitably will contribute to the study's success. The study will produce a Financing Plan, a Design Plan, an Implementation Plan, and an Operating Plan.

As you can see, Las Vegas has begun an ambitious project. THE FIRST STEP IS ALWAYS THE HARDEST, but we have taken that step. The journey will only near its destination when a modern intercity ground transportation system is operating between Las Vegas and Los Angeles.

When we have the opportunity to meet again in the 1990's, we will be able to say to each other that, together, the public and the private sectors have solved intercity transportation problems.

Thank you, Mr. Chairman and Subcommittee Members. Mr. Daly would like to address a few remarks to you, following which we will be pleased to respond to any comments or questions.

TESTIMONY

GIVEN BY

MICHAEL DALY

CONGRESSMAN GLICKMAN AND DISTINGUISHED SUBCOMMITTEE MEMBERS OF THE HOUSE TRANSPORTATION SUBCOMMITTEE.

AS MAYOR BRIARE HAS INDICATED, MY NAME IS MIKE DALY. I AM DIRECTOR FOR THE CITY OF LAS VEGAS ECONOMIC DEVELOPMENT AND ALSO THE PROJECT MANAGER OF THE LAS VEGAS-LOS ANGELES HIGH-SPEED/SUPER-SPEED GROUND TRANSPORTATION SYSTEM FEASIBILITY STUDY.

THE MAYOR HAS ASKED ME TO MAKE A FEW REMARKS, AND MY REMARKS WILL BE BRIEF, TO SUMMARIZE FOR YOU THE PROGRESS OF OUR INTERCITY GROUND TRANSPORTATION SYSTEM STUDY. I WANT TO THANK YOU FOR YOUR INCLUDING ME IN THE SUBCOMMITTEE'S CORDIAL INVITATION TO THE CITY OF LAS VEGAS TO APPEAR BEFORE YOU.

THE CITY OF LAS VEGAS WILL BE CONDUCTING A FEASIBILITY STUDY ON A PROPOSED HIGH-SPEED/SUPER-SPEED GROUND TRANSPORTATION SYSTEM BETWEEN LAS VEGAS AND LOS ANGELES. IN FACT, THE STUDY BEGAN JUST A FEW DAYS AGO.

PRIOR TO OFFERING THE CONTRACT TO THE BUDD COMPANY, THE CITY HELD A PRE-BID PROPOSAL MEETING AT WHICH THERE WERE 58 UNITED STATES AND INTERNATIONAL FIRMS REPRESENTED. WE JUST COMPLETED THE BID-REVIEW PROCESS IN WHICH 13 COMPANIES REPRESENTING SOME 50 FIRMS SUBMITTED PROPOSALS TO CONDUCT THE STUDY. THIS BID-REVIEW PROCESS CONSISTED OF THREE SEPARATE REVIEW TEAMS (THE CITY'S ADMINISTRATIVE REVIEW TEAM AND THE TECHNICAL ADVISORY COMMITTEE AND THE STUDY MANAGEMENT TASK FORCE) ANALYZING THE PROPOSALS, NARROWING THE PROPOSALS TO 5 FINALISTS, AND THEN OFFERING THE CONTRACT TO THE SUCCESSFUL PROPOSER.

THE LAS VEGAS COMMUNITY, LOCAL AND STATE GOVERNMENTS, AND REPRESENTATIVES FROM LOS ANGELES (INCLUDING MAYOR TOM BRADLEY AND DEPUTY MAYOR REMY), AND THE STATE OF CALIFORNIA HAVE BEEN ENTHUSIASTICALLY INVOLVED IN THE PROJECT SINCE ITS INCEPTION. THE PEOPLE ARE TRULY ANXIOUS TO SEE THIS SYSTEM BECOME A REALITY.

STUDY OBJECTIVES AND REQUIREMENTS

- THE PRIMARY OBJECTIVE OF THE STUDY IS TO SELECT FOR THE LAS VEGAS TO LOS ANGELES CORRIDOR A HIGH-SPEED GROUND TRANSPORTATION SYSTEM THAT IS:
    - -- FEASIBLE TO BE IMPLEMENTED IN THIS DECADE
    - -- COST-EFFECTIVE AND ECONOMICAL IN ITS OPERATION
    - -- AND THEREFORE, COMPETITIVE WITH OTHER MODES OF TRANSPORTATION, IN PARTICULAR AIR TRAVEL
    - -- HIGHLY ATTRACTIVE TO INCREASE THE DEMAND FOR RIDERSHIP AND VISITS TO LAS VEGAS
- FOR THE SELECTED SYSTEM, THE STUDY HAS TO DEVISE:
    - -- AN OVERALL IMPLEMENTATION PLAN, COVERING THE ENGINEERING AND CONSTRUCTION PHASE
    - -- AN OPERATIONS AND MAINTENANCE PLAN
    - -- AND, MOST IMPORTANTLY, A FINANCING PLAN.

WE ARE NOT INTERESTED IN A STUDY FOR A STUDY'S SAKE. A DOCUMENT WITHOUT THE ANSWERS WE NEED WILL JUST COLLECT DUST SITTING ON A SHELF SOMEWHERE.

THE CITY OF LAS VEGAS' STUDY WILL INCLUDE THE ELEMENTS THAT WE MUST HAVE ANSWERS FOR:

(1) FINANCING PLAN
(2) IMPLEMENTATION PLAN
(3) OPERATION AND MAINTENANCE PLAN

THESE ARE THE MOST CRITICAL AREAS OF THE STUDY. AS THEY ARE WORKED AND SOLUTIONS IDENTIFIED, YOU WILL BE KEPT INFORMED. THIS STUDY IS NOT ONLY OURS, BUT YOURS AS WELL. THE NATION, AND PERHAPS THE WORLD, IS WATCHING, WAITING AND EVALUATING WHAT WE DO.

IN CONCLUSION, LET ME SAY THAT WE WOULD BE GLAD TO APPEAR BEFORE YOU SOMETIME AFTER THE COMPLETION OF THE STUDY TO LET YOU KNOW ABOUT THE FINDINGS OR EARLIER IF YOU NEED MORE INFORMATION BEFORE THEN. WE WANT TO KEEP CONGRESS INFORMED OF THE STUDY PROGRESS AND ITS CONCLUSIONS.

THANK YOU FOR INVITING US HERE. WE ARE PREPARED TO ANSWER ANY QUESTIONS YOU MAY WISH TO POSE TO US.

Mr. **Glickman**. Please proceed.

Mr. **Daly**. Congressman Glickman and distinguished members of the House Transportation Subcommittee.

As Mayor Briare has indicated, my name is Mike Daly. I am director for the city of Las Vegas Economic Development and also the project manager of the Las Vegas-Los Angeles high-speed/superspeed ground transportation system feasibility study.

The mayor has asked me to make a few remarks, and my remarks will be brief, to summarize for you the progress of our intercity ground transportation system study. I want to thank you for including me in the subcommittee's cordial invitation to the city of Las Vegas to appear before you.

The city of Las Vegas will be conducting a feasibility study on a proposed high-speed/superspeed ground transportation system between Las Vegas and Los Angeles. In fact, that study is just beginning.

Prior to offering the contract to the Budd Co., the city held a prebid proposal meeting at which there were 58 United States and international firms represented. We just completed the bid-review process in which 13 companies, representing some 50 firms, submitted proposals to conduct the study. This bid-review process consisted of three separate review teams: the city's administrative review team and the Technical Advisory Committee, and the study management task force. Those 26 people spent more than 1,000 manhours in reviewing those proposals and narrowed it down to 5 finalists and just last week offered it to the Budd Co.

The Las Vegas community, local and State governments, and representatives from Los Angeles, including Mayor Tom Bradley and Deputy Mayor Remy, and the State of California have been enthusiastically involved in the project since its inception. The people are truly anxious to see this type of system become a reality.

The primary objective of the study is to select for the Las Vegas to Los Angeles corridor a high-speed ground transportation system that is feasible to be built in this decade; cost effective and economical in its operation, and therefore competitive with other modes of transportation, including air travel; highly attractive to increase the demand for ridership and visits to Las Vegas.

For the selected system the study has to devise an overall implementation plan, covering the engineering and construction phases; an operations and maintenance plan and, most importantly, a financing plan.

We are not interested in a study just for a study's sake. A document without the answers we need will just collect dust sitting on a shelf.

The city of Las Vegas' study will include the elements that we must have answers for: How do you fund it, implement it, and how do you operate it, and maintain it? They are the most critical areas of the study. As they are worked and solutions identified, you will be kept informed. This study is not only ours, but also yours. The Nation, and perhaps the world, is watching, waiting, and evaluating what we do.

In conclusion, let me say that we would be glad to appear before you sometime after the completion of the study scheduled for October, or earlier, if you need more information on what we are doing.

We want to keep Congress informed of the study and its progress and its conclusions.

Thank you for inviting us here. We are prepared to answer any questions you may wish to pose to us.

Mr. **Glickman**. Thank you both for testifying.

I would guess that your study is intended to answer questions like financing, and what type of high-speed rail system you would in fact envision between Los Angeles and Las Vegas. You are not in a position to answer those questions?

Mr. **Briare**. Only we are not committed to any sort of hardware.

One of the charges in the document, and the Budd Co., has indicated a willingness and ability to report on, is that all technologies in existence will be reported on, and then in view of the other parts of the study make a recommendation as to which vehicle would be the most feasible.

Mr. **Glickman**. You received $150,000 from an UMTA grant, or what kind of a grant did you get?

Mr. **Daly**. It was a discretionary grant from Secretary Drew Lewis, through the Federal Railroad Administration. In fact, we are the only public entity ever to receive such a grant to study a high-speed/superspeed ground transportation system. Our credibility shot up considerably as a result of that.

Mr. **Briare**. We had already raised the matching funds locally to convince the Secretary that we did not expect to come to Washington and look for 100 percent grant or a partner who would put up all the money with a partner who did not put up any.

Mr. **Glickman**. I assume that you see some Federal role, or maybe you don't, in terms of the financing of this high-speed system?

Mr. **Briare**. We do not know what the results are going to be yet, Mr. Chairman, of course, from the feasibility study. But we would expect that certain incentives could be enacted by Congress, if they do not already have the regulatory authority to govern it, for investment credits to private industry to do what was done in France.

We are very interested in the information that we had that the U.S. companies have investments in the French TGV system in the amount of $225 million. We would like to go and talk to those people.

Mr. **Glickman**. You say U.S. investors put in almost a quarter of a billion dollars into the French system?

Mr. **Briare**. Yes, Mr. Chairman. That was brought out during our interviews with the various consultants, they seemed to have been quite familiar with each other's activities and that was something that was brought up during our public meetings that we had on this.

Mr. **Glickman**. You said you were the fourth or fifth corridor in intensity of travel?

Mr. **Briare**. I believe the best definition I have is, those corridors which have the greatest potential to operate a train without subsidy from the Federal Government. This was an Amtrak study. It was done on behalf of Amtrak.

I believe they studied 22 corridors and ranked them from 1st to 22d. The corridor between Los Angeles and Las Vegas was ranked fourth, the corridor between San Diego and Las Vegas was ranked first.

Mr. GLICKMAN. OK. I think it is exciting that you are pursuing this project.

As you know, Amtrak has announced some interest through an affiliated entity, the American High Speed Rail Corp., to try to do something in the San Diego-Los Angeles corridor. I hope that your study will in fact not only include a Las Vegas-Los Angeles corridor, but how this would relate as a part of a national system of creating these corridors.

We are pleased to have you here. We look forward to hearing from you on your progress, specifically as to the results of the report to be finished, you say, sometime this fall.

Mr. BRIARE. October we expect.

Mr. GLICKMAN. Thank you.

Mr. Winn?

Mr. WINN. Thank you, Mr. Chairman.

You spelled out the difference between the high-speed and the superspeed rail system. In the study are they analyzing both types?

Mr. BRIARE. Yes, Mr. Chairman.

Mr. WINN. Both speeds?

Mr. BRIARE. They are going to look, they promised us they would look at all the technology available, including Maglev developed by West Germany and also by Japan for their magnetically levitated vehicles which have speeds upward of 200, 250 miles per hour. They would be charged with that responsibility to give us that information, to include in our selection process as to which hardware should be used.

Mr. WINN. Are you depending so much on the Los Angeles market that you are considering a nonstop train, no matter which speed you use?

Mr. BRIARE. I would imagine when the consultant looks at the possible routes to accommodate the necessary terrain and topography necessary for these new technologies, new of course to the United States, old stuff for some of the foreign countries, I am sure that there will be very few stops and, as was indicated from the marketing standpoint, there would be very few stops and a frequency would have to be there. But that would be our No. 1 market, the southern California market.

We would envision some day in the real distant future if this were to be the first, and we are not having a horserace with anyone, why, if this was the first one to be established, we expect it would automatically serve as a demonstration for other areas that would want to perhaps try to engage this type of a service to replace their present train service, if they have any passenger service at all. We would envision this to go out through the entire country.

Mr. WINN. Would you look into the possibility of the next step?

Mr. BRIARE. I would be very interested in attending that meeting going to be held in the middle of this month in Houston. I am not sure who all were invited, but it was referred to as Sun Belt States. It would be interesting to see how many States would appear, to see if there would be some way to connect the Southern States from Los Angeles to Jacksonville.

Mr. WINN. I was thinking more about your Las Vegas market, tourism. What about San Francisco?

Mr. BRIARE. Governor Brown has supported our project because he thought that any kind of a project that would move traffic around would be very good and he at one time tried to do something that we have just successfully concluded, that was to do a high-speed corridor survey in California but to go further than just San Diego-Los Angeles, but to go all the way up to Sacramento.

The legislature chose not to fund their study. So that particular study was not done consequently.

I would hope, Mr. Congressman, that certainly San Francisco and Los Angeles would 1 day be connected and we would be very delighted to welcome any and all that would like to get on our train and come to Las Vegas.

I would confess that we expect there would be a lot more interest throughout the country, that we would not be the only ones with such a system, but the main connection would be Los Angeles and Las Vegas.

Mr. WINN. What kind of fare are you talking about, or do you know?

Mr. BRIARE. We would not know. We have just had kind of an offhand guess, from a marketing standpoint, we are going to have to do it for a cost comparable to a couple of tanks full of gasoline, whatever that will cost when the train is built, because right now most people who come from Southern California drive their automobiles. It takes them 5 hours to do it. It takes about 8 hours on the Amtrak train. We would expect our speed would have to be as close to an airplane as you can get for a fare that would amount to less than the airplane fare, or else we do not have anything to sell really.

Listening to the comments by Mr. Scher from the TGV, the distances are about the same between Paris and Lyon and between Los Angeles and Las Vegas. The fares that they are speaking of, if they could be translated into the U.S. market, would be very, very attractive, and very competitive.

Mr. WINN. Thank you very much.

Mr. GLICKMAN. We thank you both, Mr. Mayor and Mr. Daly, for coming and testifying today.

Our next witnesses are Robert Casey, executive director of the Ohio Rail Transportation Authority, and Hon. Richard Geist, Representative from the State of Pennsylvania.

STATEMENT OF ROBERT CASEY, EXECUTIVE DIRECTOR, THE OHIO RAIL TRANSPORTATION AUTHORITY

Mr. CASEY. I do not believe Representative Geist made it this morning. I know they have important legislation in the Pennsylvania House today. I think that probably delayed him. He may show up tomorrow.

Representative Geist is chairman of the 5-State compact, which includes Ohio, Pennsylvania, Michigan, Indiana, and Illinois. If you hear me allude to a compact, that is what I am talking about.

Mr. GLICKMAN. Sure. Your entire statement will appear in the record. You may summarize as you deem appropriate.

Mr. CASEY. Thank you. I will summarize.

I appreciate this chance to make remarks about high-speed trains here today.

America, usually the world leader in technology, is virtually an undeveloped Nation in the technology of moving people by high-speed rail. Yet this technology is nothing less than the key to both economic development, mobility of our people, and petroleum independence.

Ten years ago gasoline sold for 30 cents a gallon. Travel by automobile was inexpensive. Indeed, Americans regarded cheap auto travel almost as a natural right. Today all that is changed.

On this morning's Today show they mentioned that the present average cost per gallon is $1.19. It was much higher than that a few weeks ago. Recently the New York Times had an editorial saying "The Energy Crisis Crisis," I think the Secretary of Energy has been quoted as saying that: Yes, the energy crisis is over until the next one.

I do not believe we are going to escape and go back to the old days when we had plenty of gasoline available at very low cost. The air situation is not any better; with deregulation came diminished services. Planes are crowded and serve fewer markets. Higher fuel costs have forced the airlines to boost their fares to a shocking degree. Before long, only business travelers with expense accounts may be able to fly. The cost of air travel hits residents of smaller cities even harder than those who live in metropolitan areas.

All this adds up to significantly less mobility for ordinary Americans and an uncertain future. Yet a high degree of mobility has been contributory to national prosperity and social progress throughout our history. Even while there is a temporary glut of oil, petroleum is a precious commodity. Its price will remain high as far into the future as we can see.

Little more can be done with repect to air service and the next generation of commercial aircraft will be designed to serve large markets such as Chicago, Los Angeles, Atlanta, and New York, not the smaller cities of America. They will go right over Ohio, for example, even though we have some rather large cities.

Superimposed on this situation is the knowledge that we will need to expand our transportation system. According to the National Transportation Policy Study Commission, we will need to almost double the infrastructure by year 2000. Yet there is little or no possibility of doubling our air facilities and highways in the next 18 years. Rail travel is the one mode in which, with new technology, improvements are possible. But precious little is being done about it.

Other nations are not putting their travel eggs in one basket, the petroleum basket. You have heard the examples today and you will hear more today and tomorrow. America used to lead the world in technology. It was in 1925 when Americans first proved an advanced transportation system based on new technology will prevail economically. New York proved it with the Erie Canal, a controversial project debated for years. But as soon as the canal was opened in 1825, the skeptics were converted.

Even though only the first leg was able to carry traffic, people started to travel who never even thought of going anywhere before. They bought new land, opened stores, farms, factories, mine shafts, built hotels, established schools and colleges. And these little villages along the route of the Canal began to grow into cities. That was new technology in its day.

The same thing occurred later on when Commodore Vanderbilt bought up the series of railroads in the area and made one railroad into the interior. He sold off his shipping fleet because he realized the new technology was railroads. The railroads did the job cheaper and faster than the Canal. So the canals faded into history. This time the economy of New York really took off as Vanderbilt's vision and determination made New York into the commercial colossus of the Western Hemisphere. Once again, a victory for new technology.

Commodore Vanderbilt, although he was 73 years old and had been running boats since the age of 16, saw the need for new technology. In the twilight of his career he became a railroader, and he taught New York to do the same. When he died 10 years later he was the richest man in America. He left his family $105 million and he left his State an empire.

Ohio and its neighbors are emulating Commodore Vanderbilt. We have formed a compact to promote the new technology of high-speed trains, which we believe will ultimately be available everywhere between Chicago and Philadelphia; as I learned today, out in the western part of the country too.

Ohio has been working for several years on a $5.7 billion program to connect our cities with high-speed trains. Much of the spadework has been accomplished, as this set of reports will indicate to you.

Lightweight, streamlined trains similar to the French TGV or Japan's famed intercity Bullet trains will carry passengers, nearly 10 million of them, on more than a billion passenger miles of travel annually.

Ohio's trains will run on dedicated, continuous welded rails. Separated road and rail grade crossings and fencing will keep autos, people and freight trains away just as the interstate highways are protected. Service will be first-class. Comfort, along with frequency of service and dependability, are key factors in attracting ridership to high-speed trains.

Ohio's system will be electrified, and thus independent of imported oil. Our 547-mile system will link Cleveland, Columbus, and Cincinnati. A second line will connect Toledo, Cleveland and Youngstown across the northern part of the State. More than 65 percent of Ohio's population of 10 million people live within 30 miles of these corridors. We also plan connections to Detroit in the North and Pittsburgh in the East.

When the system is completed, a traveler in Cleveland, for example, will be able to catch a train at the Terminal Tower on the hour, buy a ticket at a computer terminal, board a sexy, comfortable all-electric train, have breakfast, read the paper, and be in Columbus in 75 minutes, downtown Columbus, not out somewhere in a distant suburb.

During the 15-year construction life of ORTA's initial project, 46,000 work-years of jobs, involving more than 8,000 direct employees at peak, will be created. When the multiplier effect works its way through the economy, job creation will swell to 150,000 work-years. The estimated $5.7 billion construction cost will result in $20 billion in total economic impact. These numbers do not take into account the 2,700 permanent employees it will take to run the completed system.

Other States have expressed keen interest in Ohio's plans. It is with this background that I wish to strongly endorse H.R. 4028, with one reservation.

Instead of Amtrak jurisdiction, a small commission should be established to administer the Rail Passenger Systems Program. States and groups of States should be encouraged to form authorities, which would build or authorize the needed system of high-speed trains. Hopefully, there would be Federal backing, as was mentioned here by the mayor of Las Vegas, in the form of tax incentives or industrial bonds, that type of backing; and research, perhaps, but the States can do the job, just as they built the interstate highways.

This is not to say that the just-announced High-Speed Rail Corp. is not welcome because, as a pioneer in the field, Ohio was of course pleased to see the formation of this company. It is ironic, however, that this new corporation's efforts will be directed initially to the Sun belt while the Northeast-Midwest is the section in greatest need for industrial development and reindustrialization.

The announcement that this new enterprise will be privately-financed underscores the belief, long held in Ohio, that high-speed trains are profitable. America needs a rational transportation policy. By that I mean automobiles will be used primarily for local travel, say around up to 50 miles from your home; for very long-distance travel most people would prefer to fly, get there in shorter time. But in between, say 50 to 500 miles, we need high-speed trains.

Therefore, I urge the Congress not only to enact H.R. 4028 sans Amtrak, but also to encourage development of an integrated transportation system through other legislation.

Like Congressman Reuss, I believe we can put the next generation to work reindustrializing our Nation all by this one bold stroke. As he stated, we can have an American revival based on the revitalization of our railroads. With an electrically-powered high-speed passenger railroad system, America will for the first time have a chance to wrest a major part of their personal mobility out of the hands of Arab sheiks and comic-opera dictators. Even if these trains do nothing else, the energy independence they will bring us will be worth all the money we expect to invest in them.

We need the advanced technology now in use in other countries, we need mobility for our people, and we need a program for the reindustrialization of America.

Like Commodore Vanderbilt, we must learn to be railroaders—this time high-speed, electrified railroaders.

Several witnesses comment about the pictures in this room concerning the space program. If you recall, In the Sixties President Kennedy said, we will reach the moon within this decade. In Columbus, Ohio, in 1982 we say, within the decade we will reach Cleveland.

[The prepared statement of Mr. Casey follows:]

TESTIMONY CONCERNING
THE TECHNOLOGY OF AND NEED FOR
HIGH SPEED PASSENGER RAILROADS
(H. R. 4028)

COMMITTEE ON SCIENCE AND TECHNOLOGY

SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

APRIL 5, 1982

BY
ROBERT J. CASEY
EXECUTIVE DIRECTOR
THE OHIO RAIL TRANSPORTATION AUTHORITY
30 EAST BROAD STREET
COLUMBUS, OHIO 43215

Thank you for this opportunity to appear before the Subcommittee on Transportation, Aviation and Materials. With me is the Honorable Richard A. Geist, member of the Pennsylvania House of Representatives and chairman of the five-state high speed rail compact.

America, usually the world leader in technology, is virtually an undeveloped nation in the technology of moving people by high speed rail. Yet this technology is nothing less than the key to both economic development and the mobility of our people.

Ten years ago, gasoline sold for 30 cents a gallon. Travel by automobile for business or pleasure was inexpensive. Indeed Americans regarded cheap auto travel almost as a natural right. In summer, highways were crowded with cars as Americans toured the land and introduced their children to the wonders of the continent.

Today, all that is changed. Gasoline sells in the neighborhood of $1.05 to $1.35 a gallon. People with modest incomes have to be very careful about how they use their cars--even if the cars are much smaller and get greater mileage than the old gas guzzlers of the 1960's and early seventies.

The situation isn't any better with respect to air travel. With deregulation of the airlines came diminshed service. Planes are crowded and serve fewer markets. Higher fuel costs have forced the airlines to boost their fares to a shocking degree. Before long, only business travelers with expense accounts may be able to fly. The cost of air travel hits residents of smaller cities even harder than those who live in metropolitan areas.

While automobile and air travel opportunities have been reduced, the meager Amtrak system isn't much help, except in the Northeast Corridor.

All this adds up to significantly less mobility for ordinary Americans and an uncertain future. Yet a high degree of mobility has been a feature of American life for generations. It has been a major contributor to national prosperity and social progress.

There's little we can do to improve the situation with respect to travel by auto. While there is a temporary glut of oil, petrolsum is a precious commodity. Its price will remain high as far into the future as we can see. This suggests that the great age of the auto has passed.

Little more can be done with respect to air service. The airlines have heavy capital expenditures ahead of them as they replace the first generation of wide-bodied jets. The next generation of commercial aircraft will be designed to serve large markets such as Chicago, Los Angeles, Atlanta and New York, not the smaller cities of America.

Superimposed on this situation is the knowledge that we will need to expand our transportation system in the future. According to the National Transportation Policy Study Commission, we will need to almost double the infrastructure by year 2000. Yet, there is little or no possibility of doubling our air facilities and highways in the next 18 years. Rail travel is the one mode in which (with new technology) improvements are possible.

But precious little is done about it in this country.

Other nations are not putting their travel eggs in the petroleum basket. For example:

1. The Japanese keep expanding their famous "bullet train." Additionally, they are looking to the future in other ways. In December of 1979, at the Miyazaki Test Track in Southern Japan, a prototype magnetically levitated vehicle reached a speed of 323 mph.

2. At or near the same time a modified Shinkansen "Bullet Train" reached a speed of 197 mph. It will soon go into revenue service.

3. The French have perfected their TGV vehicle between Paris and the South of France. It now holds the world speed record for trains, having traveled at 238 mph.

4. The West Germans are deep into research and development of magnetically levitated vehicles which they hope to market internationally by 1985.

5. Many British trains today run at 125 mph and development continues on the Advanced British Passenger Train (APT), designed to run at 160 mph.

6. In Italy and Spain, the tilt-coach ETR 401 (called the Pendolino) can run at 150 mph.

Impressive as these overseas developments are, what do they mean to the people of America? The answer is simple, yet it reaches to the very heart of our security, our freedom of travel, our future.

Events of the past few years have proven beyond the shadow of a doubt that our present transportation system is on a collision course with reality. It is a system built upon a foundation of dependence on foreign oil. A foundation that stakes our security on the politics of a distant, turbulent region. A foundation that chains our mobility to a thin line of tankers stretched halfway around the world. A foundation that crumbled before our eyes during the 1970's and that could vanish altogether in the future as petroleum, once so cheap and abundant, becomes depleted or denied to America through world events.

Yet there is a solution, as our allies throughout the world have proven so dramatically. In fact, outside of North America, no developed country has ever deserted its railroads. Instead they have created dazzling technology and unrivaled speed, comfort, safety, and reliability in intercity travel. And it is travel that is totally independent of petroleum.

It was in 1825 when Americans first proved that an advanced transportation system will prevail economically.

New York proved it with the Erie Canal, a controversial, expensive project that was debated up and down the state of New York for many years. But as soon as the canal was opened in 1825 -- after 8 years of construction -- the skeptics were converted. Even though only the first leg was able to carry traffic, people started to travel, many of them people who had never thought of going anywhere at all until the reality of the canal suddenly lay before them. They bought new land, opened stores and farms and factories, sank mine shafts, built hotels and established schools and colleges. All along the route of the canal, peaceful, rustic villages began to bloom, and several entirely new towns were founded simply to take advantage of the canal's existance. Schenectady, Amsterdam, Utica, Syracuse and Rochester formed a chain of industrial and commercial centers that helped make New York the "Empire State." All because of "New Technology."

These developments took place because New York was the first state in the Union to understand the connection between mobility and opportunity -- and to do something about it by building a modern transportation facility. The state began to prosper immediately, and so did New York City, as immigrants discovered that it offered the easiest route into the American heartland.

As exciting as the Erie Canal was, however, it was obsolete within a generation, and New York's supremacy was endangered. Railroad technology had appeared, and with it the possibility that some other Eastern seaport -- perhaps Boston or Baltimore or Philadelphia -- might push its own transportation route into the interior of the nation, bypassing the Erie Canal and oust New York from its position of leadership. At one point a group of Massachusetts investors actually tried it.

But before they could raise enough money, a bold New York executive foiled the plot and gave his state and city a whole new lease on life that would last more than a century. "Commodore" Cornelius Vanderbilt sold off his shipping fleet and used the proceeds to buy up a string of little railroads paralleling the Erie Canal. Combining them under one management, he connected them at Albany to another railroad running down to New York City and by the close of the Civil War had formed a railroad system that could do everything the canal could do -- only faster and cheaper. This time the economy of New York really took off as Vanderbilt's vision and determination sealed Boston's fate and made New York into the commercial-industrial colossus of the western hemisphere. Once again a victory for "New Technology."

Many American states today are in the same position as New York was in the declining years of the Erie Canal. They need a new way to provide mobility for their people.

Commodore Vanderbilt, although he was 73 years old and had been running boats since the age of 16, saw the need for new technology.

In the twilight of his career he became a railroader, and he taught New York to do the same. When he died 10 years later he was the richest man in America. He left his family $105 million and he left his state an empire.

Ohio and four of its neighbor states are emulating Commodore Vanderbilt. With the states of Pennsylvania, Michigan, Illinois and Indiana, we have formed a compact, to promote the new technology of high speed trains which we believe will ultimately be available everywhere between Chicago and Philadelphia.

Ohio has been working for several years on a $5.7 billion program to connect our cities with high speed trains, by which I mean trains that run at 160 miles per hour.

Lightweight, streamlined trains similar to the French TGV or Japan's famed intercity Bullet trains will carry passsengers, nearly nine million of them, on more than one billion passenger miles of travel annually.

Ohio's trains will run on dedicated, continuous welded rails. Separated road and rail grade crossings and fencing will keep autos, people and freight trains away from ORTA's speeding trains, just as the interstate highways are protected.

Service will be first class. Comfort, along with frequency of service, and dependability are key factors in attracting ridership to high speed trains.

In Japan since 1964 more than one and a half billion passengers have chosen the Bullet trains over other possible modes of transportation. The energy savings have been incalculable. But two other facts are more arresting.

In the same span of time, 800,000 Americans have died in highway accidents and millions more have been injured. Not a single passenger injury or fatality has occurred on Japan's Shinkansen line. Not one.

Ohio's system will be electrified, and thus independent of imported oil. The state has vast coal fields, and our utilities can meet the electrical needs of a high speed railroad with ease.

Our trains will link Cleveland, Columbus and Cincinnati, the 3C Corridor. A second line will connect Toledo, Cleveland and Youngstown across the northern part of the state. More than 65 percent of Ohio's population of ten million people live within 30 miles of these corridors. We also plan connections to Detroit in the North and Pittsburgh in the East.

When the system is completed, a traveler in Cleveland, for example, will be able to catch a train at the Terminal Tower on the hour, buy a ticket at a computer terminal, board a sexy, comfortable all-electric train, have breakfast, read the paper, and be in Columbus in 75 minutes.

The project comes at a time when the boost it will give the state is vital. Ohio has been losing jobs and industry for more than a decade.

Ohio's major manufacturing industries are transportation, primary metals, fabricated metals, electrical machinery and nonelectrical machinery. All five of these industries, and many more, will be involved. Consider what occurred in Japan.

Construction of the 247 mi. Sanyo Sninkansen line meant the following to that country's economy: 219 primary contractors, 500 subcontractors and 550 manufacturing companies were engaged to handle the civil engineering and track work; 346 primary contractors, 500 subcontractors and 1,500 manufacturers were needed for the electrical work; 23 primary contractors and 500 subcontractors manufacutred the rolling stock. The project consumed 286,000,000 cubic feet of concrete, 2,450,000 tons of cement, 279,000,000 cubic feet of aggregate, 580,000 tons of steel and iron and 8,903,000 KWH of electricity. Ohio's plans call for a complete system of 547 miles.

During the 15 year construction life of ORTA's initial project, 46,000 work years of jobs, involving more than 8,000 direct employees, will be created. When the multiplier effect works its way through the economy, job creation will swell to 150,000 work years. The estimated $5.7 billion construction cost will result in $20 billion in total economic impact. These numbers don't take into account the 2,700 permanent employees it will take to run the completed system.

Unlike Amtrak trains, which run across Ohio in an east/west pattern, ORTA's trains will move north/south, linking our great cities. We feel our corridors are among the most viable in America.

On the subject of corridors, the major difference between Ohio's position and that of the Emerging Corridors Study is that Ohio is looking at the needs of its populace in an overall transportation system and not that of just "what will it cost for rail service." Where would our interstate highway system be today if it were costed out on return-on-investment?

Further dissimilarities between concepts occur in the operational environment as evolved by Ohio and those advocated by Amtrak. Ohio looked at travel specifics between city centers as to the populace to be served, what is their present transportation mode, what is their access, what will be their access to rail, what transportation mix will be needed for this access. In general terms, who wants to go where, and when do they wish to arrive and depart. From this we tailored our schedules and corridors to meet people needs, not just arbitrarily assigning 3 or 6 round trips per day as was done in the Emerging Corridors Study.

This tailoring of schedules gave us more realistic patronage figures as well as a more in-depth view of the transportation needs of the populace. It also, raised the question: "Can existing trackage support the needed schedule as to performance and safety?" The answer to both became an emphatic NO!

Much of the existing trackage on our Cleveland-Columbus-Cincinnati corridor is now at or near capacity with freight operations. Passenger operations could not be scheduled or hope to maintain reasonable times under these conditions. If this is so on this corridor, what of the rest? The entire Emerging Corridor Study is flawed in this respect.

For this reason and for the paramount issue of safety, Ohio opted for dedicated right-of-way for its proposed system. For operational capability, maintenance cost, scheduling and maintaining the schedule, signaling conflicts, design criteria and safety, the dedicated right-of-way for exclusive passenger train movements is superior and more economical in the long run.

We find it hard to understand the Emerging Corridors rational for offering the people of the U.S. antiquated, obsolete service at speeds up to only 79 mph. America had this or better in the 1930's and 40's! It's time we turn to the future and join the rest of the world in the matter of passenger rail transportation.

Other states, including California, Florida and Nevada have expressed keen interest in Ohio's plans. It is with this background that I wish to strongly endorse H.R. 4028, with one reservation.

Instead of Amtrak jurisdiction, a small commission should be established to administer the Rail Passenger Systems Program. States and groups of states should be encouraged to form authorities, which would build the needed system of high speed trains. Hopefully, there would be Federal encouragement in the form of loan guarantees, tax advantages, technical advice and other support. The states can do the job just as they built the interstate highways. We do not need an Amtrak bureauracy in

Washington directing the effort. In fact, the effort will be very costly and take much longer if it is assigned to Amtrak.

In testimony here last year, Albro Martin of the Harvard University School of Business Administration, said ".....this is the wrong kind of undertaking to leave in the hands of Amtrak.....". Frankly, Amtrak is not in the same league with the European and Japanese systems and its involvment could be a "chilling factor" in the development of high speed trains.

America needs a rational transportation system. We must conserve precious petroleum for our local trips--to work, to the store, to school, to football games--within a 50 mile radius of our homes. To go long distances, most people prefer to fly.

But, in between, from 50 to about 500 miles, high speed trains are needed. That's what I mean by a rational transportation policy, a system of highways, fast trains and aircraft, carefully orchestrated.

Therefore, I urge the Congress not only to enact H.B. 4028 sans Amtrak, but also to encourage development of an integrated transportation system, i.e., automobiles for "local" use, high speed electrified trains for up to 500 miles, and aircraft restricted to longer distance trips (after trains are in place).

Like Congressman Henry S. Reuss, I believe we can put the next generation to work making rail equipment, provide a balanced transportation system, and re-industrialize our nation -- all by this one bold stroke! As he stated, "we can have an American revival, based on the revitalization of our railroads."

Any analysis of transportation would be incomplete without observing that:

> 1. Trains can move people from one place to another very quickly and in large numbers without making people feel "packaged" or part of a faceless mass. Accommodations can be arranged to suit a whole range of demands for privacy.
>
> 2. Trains can carry passengers in greater safety than any other form of transportation.
>
> 3. Trains can carry passengers in great comfort and with less fatigue than any other mode of transportation.
>
> 4. Trains can do the job using less land and fuel while producing less air, water and noise pollution than any other mode of transportation. Its presence in the environment is the least intrusive of all forms of industrial activity.
>
> 5. It is the only large scale method of mass transportation capable of being propelled by electricity. Coal-generated electricity. With an electrically powered high speed passenger railroad system, America will for the first time have a chance to wrest a major part of their personal mobility out of the hands of Arab sheikhs and comic-opera dictators. Even if these trains do nothing else, the energy independence they will bring us will be worth all the money we expect to invest in them.

We cannot look to a new Commodore Vanderbilt today, because the magnitude of the problem and its solution indicate the need for government support, although that is not to say that the private sector should not also be involved in financing high speed systems. In fact, the private sector must be involved.

We need the advanced technology now in use in other countries, we need mobility for our people and we need a program for the re-industrialization of America.

Professor Martin of Harvard put it well when he said that if we do not build high speed train systems, we will not miss them. What we will miss is a revitalized, diversified American industrial society in the Northeast and a Sunbelt that will escape similar problems now looming over it. Like Commodore Vanderbilt, we must learn to be railroaders--this time, high speed, electrified railroaders.

Now I'd like to introduce the Honorable Richard Geist of Pennsylvania, chairman of the five-state high speed rail interstate compact.

Mr. Glickman. Thank you for your testimony.

I want to know what this sexy train is that you have in mind. You can either board a nonsexy or a sexy train.

Mr. Casey. You saw it on the television monitor this morning.

Mr. Glickman. OK. I would like to ask you a couple of basic questions.

There is an implication I think in your statement that advanced foreign technology is critical to your system. You talk about foreign technology. We have demonstrated domestic technology can operate trains at 150 miles an hour. We just have not seen fit to commercialize that technology.

Mr. Casey. We in Ohio have plans for a test track on which we will test both foreign and domestic trains to determine which technology will be the most appropriate for our State. I agree with you that the technology is not the big secret, the big secret is the dedicated right-of-way, because you cannot have any interference with a train going 160 miles an hour. In some cases our train will be going down the middle of the interstate highway.

Mr. Glickman. Are you envisioning building a test track similar to Pueblo?

Mr. Casey. No, ours will be tailored for high-speed passenger train purposes.

As I understand Pueblo, it is primarily for freight testing.

Mr. Glickman. It is unclear whether the administration is going to continue to fund that anyway.

Mr. Casey. That is correct.

Mr. Glickman. What about financing?

Mr. Casey. Ohio has a plan for a 1-cent sales tax, based on a constitutional amendment which we think will be on the ballot this fall. It has been passed by a bipartisan vote in our house, and is now in our senate. We expect to hear now shortly that it has been reported out and then will go on the ballot.

Mr. Glickman. How do you see this fitting in with some sort of national plan?

Mr. Casey. Well, we always have said we can build our own facility, our own train. We were a voice crying in the wilderness some time ago. But now there is a lot of interest everywhere in the country. People have come to us. We have explained our plans, given them copies of all our studies and everything. But we feel that the Federal Government should get interested and should encourage this all over the Nation, but in doing so, it should be fair, it should treat all States equally, and not just permit an adventure in only California or Florida. There should be equal treatment for all the States. Each State should be able to take advantage of the Federal law if it desires to do so.

Mr. Glickman. Go back to the financing. You talk about a 1-cent sales tax. If passed, what is that going to finance?

Mr. Casey. That is going to finance the entire system which is going to be built in Ohio. It will take 15 years to build the entire system, which will cost about $5.7 billion.

Now that money, when it first starts coming in from the sales tax, will be invested, there will be investment income involved here too because we will not be able to build it fast enough to use the money coming in from the sales tax in the initial years. Later on the investment money will be used up and then we will be digging into the capital, you might say.

Mr. GLICKMAN. You raised some fairly negative feelings about Amtrak. You used to work with Amtrak.

Mr. CASEY. That is correct, Congressman.

Mr. GLICKMAN. You said you would not want Amtrak involved. You would want that to be done outside the ambit of Amtrak.

Mr. CASEY. The reason I say that is it is an image problem as far as Amtrak is concerned. I certainly know because I had to fight this every day of my life when I worked there for 5 years. It is a problem. A reporter asked me out in the hall, "Why would your train work if Amtrak has not been able to get any success with their trains now?"

It is something people can't understand. They think you are going to go immediately into ordinary trains running on the same track as freight trains, one a day, infrequently. For example, in Ohio we have two Amtrak trains a day going in the middle of the night. That is not much service. How can you get people interested? But if you have a train every hour or half hour, as prior witnesses mentioned, this is one of the secrets of the new technology, if you will.

Mr. GLICKMAN. Thank you.

Mr. Winn?

Mr. WINN. Speaking of every hour or half hour, you could not justify an every hour trip from Columbus to Cleveland, could you?

Mr. CASEY. Oh, yes, you can.

Mr. WINN. Is there that much traffic?

Mr. CASEY. Absolutely, particularly Cincinnati through Dayton and Columbus is even much more so. The computer studies and the various studies we have undertaken have indicated there is a market there, if you provide the right kind of service, because of the fact that automobiles are now so expensive, because of the fact that gasoline is much more expensive than it used to be; it will remain that way. It is a matter of, if the train is available, people will ride it.

I think you have a perfect example here in the Washington Metro, which is ahead of its projections as far as patronage is concerned. But there is another matter involved also, that is safety.

Someone asked, I think you asked about seatbelts on the French train. As I understand, it may be the witnesses tomorrow from Japan will be able to tell you specifics, but in all that time, which is about 17 or 18 years, they have not had a single passenger injured or killed, not a single one.

Mr. WINN. I think they have had a few shoved once in a while.

Mr. CASEY. I understand that they have.

Mr. WINN. I think you said there might be a train going down the center of interstate highways.

Mr. CASEY. That is correct.

Mr. WINN. Is that because you want to use the right-of-way there between lanes?

Mr. CASEY. Well, tomorrow, you will hear from one of our consultants, Dalton-Dalton-Newport's Dr. Thomas Webb. I think you could direct that question to him because they are the ones who laid out the course of the train, and I do not know precisely the reason why they chose that particular location.

Mr. WINN. I would think that would be the reason because you do not have to do battle with the environmentalists or anybody else, but you would have to build bridges and overpasses in the center strips.

Mr. CASEY. On the other hand, most center strips would not be too convenient for the use of high-speed trains because if you are going at 160 miles an hour, you need much more gentle curves than are available on the interstates.

Mr. WINN. Yes, you mentioned the Metro system here. I think it is a pretty good one, except that they constantly increase their prices. There is always going to be a stage, at somewhere along the line they are going to price themselves right past the price of gasoline and people are going to start to drive their cars downtown again.

I do not know that I have a question on it, but in your proposals have you arrived at a passenger fare system?

Mr. CASEY. Yes; we have a tentative schedule of fares which indicates that there will be more than a busfare if there were a bus available between the communities but it would be less than airfare and probably by the time they are in operation it would be much less than automobile costs.

Mr. WINN. You have conventional trains now, don't you, between Columbus and Dayton?

Mr. CASEY. No; we do not.

Mr. WINN. You do not have any conventional trains?

Mr. CASEY. No.

Mr. WINN. Between any of those cities?

Mr. CASEY. There is one train a day that goes between Detroit and Cleveland.

Mr. WINN. Passenger only?

Mr. CASEY. That is the Lakeshore Limited, right.

Mr. WINN. That is passenger only?

Mr. CASEY. Amtrak.

Mr. WINN. Since you were with Amtrak, the Federal Government kept piling money in there for a while. What seemed to be the problem? What is the drawback?

Amtrak passengers have come in here always complaining about the trains being late, food being bad, et cetera. Is this just an attitude or are the communications bad among the executives? They have some talented people at Amtrak but they never did seem to keep their time schedule.

Mr. CASEY. To be perfectly honest, Congressman Winn, Amtrak was established to fail. If you recall the Watergate tapes, there was one in there which conclusively indicates that it was set up to fail. It has succeeded despite this initial concept. It has had a very difficult time. It has very many good employees, good executives, dedicated people, hard-working people, but they are running on the same track with freight trains. At one time this was perfectly logical. Today it is not. It is two different technologies, mixing apples and oranges.

Mr. WINN. The point is that to get any kind of speed and stay on schedule, you cannot mix it with freight trains?

Mr. Casey. Partly because——

Mr. Winn. Using an old bed system?

Mr. Casey. That is true.

I was testifying last year before Congressman Reuss' committee and I mentioned Amtrak had a siege mentality. That is part of the reason I do not think this should be assigned to Amtrak because they are very defensive and should well be defensive because they are always being starved for money, cannot really get their new programs going before someone is trying to cut their budget again. It is a very difficult problem.

However, that mentality and that reputation they have should not bog down this new program.

Mr. Winn. Thank you very much.

Mr. Glickman. I would just like to follow up.

You say the Watergate tapes?

Mr. Casey. That is correct.

Mr. Glickman. Could you elaborate on that?

Mr. Casey. I will be glad to send you a copy after I go through my files and find them, but there was a discussion in the White House, I think it was John Ehrlichman, who alluded to the formation of Amtrak track as a transitory matter to get rid of passenger service completely, railroad passenger service.

Mr. Glickman. I would be curious to see that.

Mr. Casey. It has been published many times.

Mr. Glickman. OK. We thank you for your testimony and we will be interested in following up on the results of not only your study but also whether your voters do approve the constitutional amendment.

Mr. Casey. We will let you know.

Mr. Glickman. I am not sure our next two witnesses are here. Mr. Blanchette cannot testify until 1 o'clock today.

Are Mr. Harris and Mr. Meetze from the Association of American Railroads here today? Are you ready to go?

OK, let's go. After you, I think we would like to break for lunch for perhaps an hour or so. Without objection your entire statement will appear in the record.

STATEMENTS OF WILLIAM HARRIS, JR., VICE PRESIDENT, RESEARCH AND TEST DEPARTMENT ASSOCIATION, OF AMERICAN RAILROADS, AND HENRY MEETZE, PRESIDENT, RAIL, INC.

Mr. Harris. I would like to start our testimony, in light of the questions you directed to us, with a review of the research program of AAR and other issues of concern to this committee. As you already indicated, my name is Harris, I am vice president for research of AAR.

The research done for the freight railroad system in the United States is performed by some railroads with research programs of their own. It is performed in part by the railroad supply industry in developing new components; it is now being performed to some extent by the Federal Railroad Administration and also by the Association of American Railroads.

I have the largest segment of research in the private sector. FRA's program has been substantially larger, but it is now being reduced to be somewhat larger than our current program. Our research program has grown substantially since 1971. It is directed toward assuring that the freight railroad system of the United States maintains effective technology on behalf of effective and safe service in rail transportation.

I have submitted a report for the record. I would like just to comment very briefly on the current situation in research.

Mr. Glickman. That would be fine.

Mr. Harris. Our research effort is based on our collective understanding of the problems that the industry is confronting. Those problems include safety.

One of our major problems early in the decade of the 1970's was tank car safety. By cooperative research with the tank car industry and with FRA, we have essentially solved the principal concern, namely, the violent rupture of tank cars. That problem has been laid to rest by virtue of improvements in tank cars that have been incorporated in existing cars by a retrofit program and that are included in all new cars.

We have been very much concerned about the dynamic stability of trains operating over tracks and, as a result, have a program, again jointly funded by the railroads, railroad supply industry, the Canadian Government and the FRA. We have made very significant progress in defining the dynamic interactions of trains with track structure, such that we now have guidelines out for the instruction of locomotive engineers. We have many programs that define much more clearly how better to operate trains.

Our program looking to the future is taking that information and designing a new series of cars that are more stable and more capable of performing the transportation function.

We have done a substantial amount of work on materials. We have improved rail materials and have contributed to better welding practices so that the continuous welded rail, important both in freight and passenger traffic, can be achieved with a very high degree of safe service.

During the last 10 years and continuing, we have made very significant progress in improving railroad wheels. We have done this by defining the conditions under which wheels should operate and giving guidance to the railroad supply industry that has responded with very much improved designs.

The price of fuel, of course, has gone up very rapidly in our program. Fuel now represents about $4.5 billion per year to the American railroad freight industry. Accordingly, with the cooperation of the railroads, the locomotive builders and some individuals and companies in the petroleum industry, we have been conducting a number of studies looking at alternative fuels for use in diesel electric locomotives, and expect to be able to save substantial amounts of money by using fuels that have heretofore not been thought to be fully acceptable for use in locomotives.

One of your questions concerned the issue of freight car management. Starting in 1974, we began a very serious study of freight car management practices. We are interested in determining how cars could be distributed more effectively to reduce the number of empty car miles and thus to allow for cars to serve the shippers more effectively.

A number of experiments have been conducted with the endorsement of the ICC when necessary. We have found techniques the railroads have used to advantage to achieve better car distribution, and we have worked with some major shippers so as to achieve those objectives such that we have observed significant reductions in empty car miles per loaded car mile.

Of course, we are all looking forward to the time when the freight car fleet is much more adequately used by the shipping industry. Now the recession has seriously affected the number of carloads that we are given to move. We have a great deal of equipment which is stockpiled. We believe the new information techniques in place, supported in part by Mr. Meetze and the very effective work the communications people have done, will make it possible for the freight railroad system to be a very much more useful part of our economy and much more effective in the area of freight car management.

The programs we have engaged in have, as you may imply from our remarks, been cooperative in nature. That is, we have always sought (a) to be sure we have a clear definition of the problem; (b) to be sure the suppliers, individual railroads, shippers, and rail labor, when appropriate, can play a part in our program.

The fact that we have been able to draw on these resources including those from FRA and other governments has made possible our participation in the management of a $25 million a year program when our funding was only $5 million.

In consequence of these advances in technology, there is no doubt in my mind that the North American Freight Railroad System is, in fact, the high technology freight railroad system in the world. There are a few selected railroads in Australia and in South Africa and in Brazil and, of course, in Canada, that carry major loads of heavy commodities from the mine to a seaport. We have good communications with those other railroads that are also high technology, but by comparison to any other railroad system in the world, ours is the only one that is in the private sector and that is, in fact, paying taxes.

It is providing a very real service to our economy. Although we have very high technology in the freight railroad system, speed of 125 MPH and above are not required in the freight railroad system, as it is in the passenger system abroad or proposed in the U.S.

Earlier witnesses who talked about the U.S. rail technology being behind the rest of the world were talking about high speed passenger service, not about the freight railroad system.

As a consequence of the reduction in the research program of FRA from about $50 million last year to $20 million requested this year, the AAR board has authorized a substantial increase over the next 2 or 3 years on our own program to pick up at least part of that slack on the problems that we consider to be the most important.

So we are recognizing the need for research to go ahead to resolve and deal with these problems of safety, improved transportation effectiveness and efficiency.

We are prepared to continue to pursue those activities as aggressively as we know how.

While you did not ask for comments on the transportation test center, I will be happy to respond to questions on its current status. Perhaps you would like to hear Mr. Meetze.

[The prepared statement of Mr. Harris follows:]

Statement of
William J. Harris, Jr.
Vice President, Research and Test Department
Association of American Railroads

An Overview of Research and Test Department Activities

My name is William J. Harris, Jr. and I am Vice President of the Research and Test Department of the Association of Americn Railroads (the AAR). The AAR is a voluntary, unincorporated, non-profit organization composed of member railroads operating in the United States, Canada, and Mexico. Its members operate 95 percent of the railroad mileage and produce 97 percent of the revenues of all United States railroads and employ 94 percent of railroad workers.

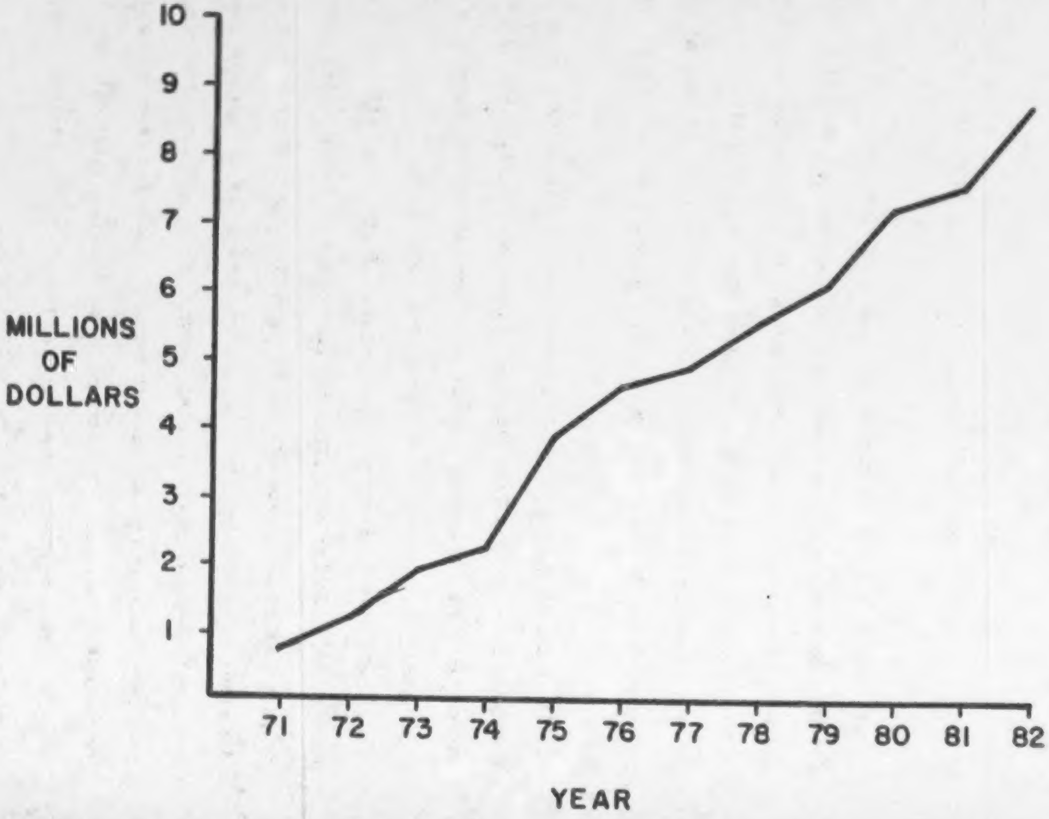
In response to your request, my testimony will provide a brief overview of the AAR's Research and Test Program, discuss specifically the issue of freight car utilization, and comment on the relationship of our research activities to high-speed rail systems and advanced rail technology.

I would like to make two major points. First, the railroad industry is consistently seeking to utilize the most advanced technologies available, and to push forward the state-of-the-art in railroading. This commitment is demonstrated by the industry's consistent increases in research funding despite inadequate profit levels. Second, there are many areas in which rail passenger and rail freight service benefit alike from research activities and technological advances, but the differences in institutional structure and service requirements for passenger and freight transportation frequently lead to different applications of technology.

The Research and Test Department was organized as an AAR Department in 1971. Its role is to apply engineering, systems analysis and economic principles to railroad problems so as to improve the safety and effectiveness of rail transportation. Since 1971 the Department's budget, provided by the railroads it represents, has increased from $700,000 to $9.4 million (Exhibit 1). This is an indication of the increasing importance with which the AAR Board of Directors views railroad research. I will return to this point in a few moments.

EXHIBIT 1

RESEARCH AND TEST DEPARTMENT BUDGET



The Research and Test Department maintains offices and laboratories in Washington, our headquarters; Chicago, where our Technical Center and Track Research Laboratory are located; and in Pueblo, Colorado, at the Transportation Test Center. We currently employ a staff of approximately 135. Of these, 30 are in Washington, 100 in Chicago, and 5 in Pueblo. Approximately 60 percent of the staff have professional or managerial responsibilities. The remainder include the many superb technically trained technicians who make our program work.

The key element of our research program is the cooperative approach. We learned some time ago that good research is rarely accomplished by researchers locked in isolation from the real world. Good research starts with problem identification and definition. We believe this is best accomplished through user involvement from the beginning. We always try to include the major potential beneficiaries of a program or project on the steering committee which guides that program. To be sure we are not following only our own fancies, we attempt to get resource commitments from other potentially interested institutions. If a project fails to win the support of anyone but us there is a good chance that it is not on target with perceived needs of the industry.

We carry this approach to the governing body of the Department, the AAR Research Committee. On this committee, which approves our program and budget, sit officers from sixteen railroads representing all of the major technical interests of the railroad community from marketing through civil and mechanical engineering to operations and to those who are responsible for planning or for the research activities of the individual railroads.

Railway technology is extremely complex and involves a wide range of disciplines. We, therefore, employ a large number of consulting specialists on a part-time basis. This enables us to avail ourselves of the many highly specialized skills required without swelling our staff beyond reason. To help us select these people and to ensure that our people are using the best technology, we seek the guidance of a team of senior academicians chaired by Professor Morris Cohen of MIT and including Dean Daniel Drucker of the University of Illinois (Exhibit 2).

Our organization is shown in Exhibit 3 and includes some twelve divisions ranging from track research to engineering economics. The staff is flexible and adaptive. It is assigned to various operating "divisions" by area of interest and field of expertise. These divisions are organized to be able to maintain a sustained level of research development in certain areas over a relatively long period of time.

However, many problems require a much shorter time frame or require a multi-disciplined attack. For these projects any combination of individuals may be assigned. This approach has the dual advantage of providing both depth of experience and the ability to tackle a problem, using different viewpoints stemming from different backgrounds.

Other problem areas are of such magnitude that they are dealt with through a formal cooperative program between the AAR and other institutions, such as the Federal Railroad Administration (FRA) and Railway Progress Institute (RPI--a national association for the railroad and rapid transit supply industry). Cooperative programs are always directed by a steering committee, have a small group of R&T staff, and utilize contributed or consultant help where necessary. This structure not only provides opportunities to enhance R&T funding and personnel, but also greatly assists in the transfer of technology developed during the program.

EXHIBIT 2

MATERIALS ADVISORY COMMITTEE

HAROLD BERGER
PROGRAM MANAGER—
NONDESTRUCTIVE EVALUATION
NATIONAL BUREAU OF
STANDARDS

DANIEL DRUCKER, DEAN
UNIVERSITY OF ILLINOIS

JOHN P. HIRTH, PROFESSOR
OHIO STATE UNIVERSITY

ERNEST RABINOWICZ
MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

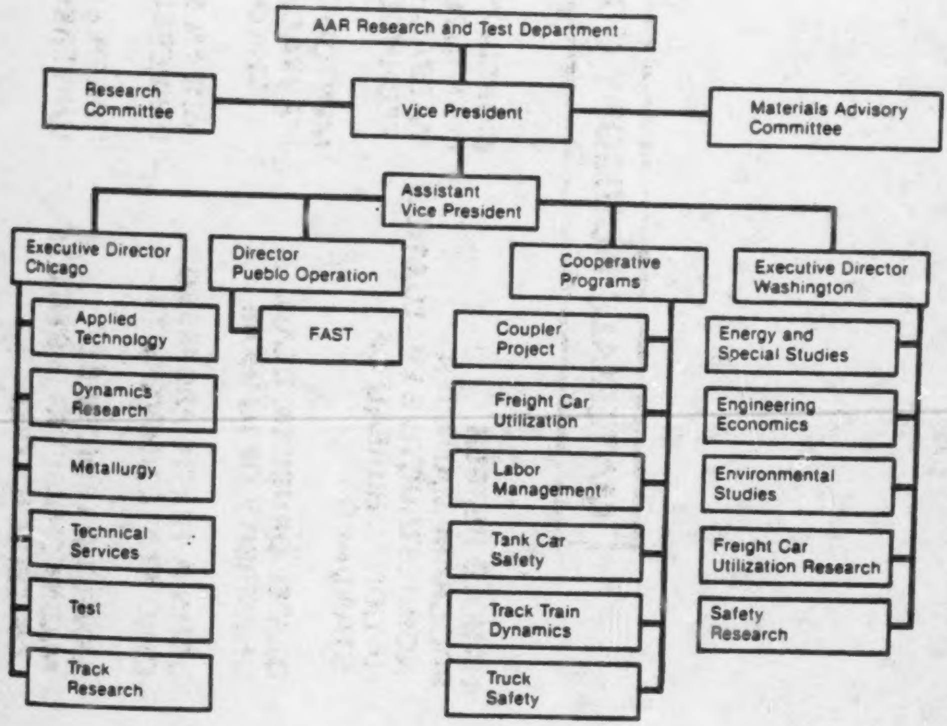
MORRIS COHEN (CHAIRMAN)
INSTITUTE PROFESSOR, EMERITUS
MASSACHUSETTS INSTITUTE OF
TECHNOLOGY

MERTON C. FLEMINGS, PROFESSOR
MASSACHUSETTS INSTITUTE OF
TECHNOLOGY

JoDEAN MORROW, PROFESSOR
UNIVERSITY OF ILLINOIS

ROGER STAEHLE, DEAN
UNIVERSITY OF MINNESOTA

EXHIBIT 3


AAR Research and Test Department
Research Committee
Vice President
Materials Advisory Committee
Assistant Vice President
Executive Director Chicago
Director Pueblo Operation
Cooperative Programs
Executive Director Washington
Applied Technology
Dynamics Research
Metallurgy
Technical Services
Test
Track Research
FAST
Coupler Project
Freight Car Utilization
Labor Management
Tank Car Safety
Track Train Dynamics
Truck Safety
Energy and Special Studies
Engineering Economics
Environmental Studies
Freight Car Utilization Research
Safety Research

The primary objectives of AAR research are to provide railroads with the knowledge necessary to improve safety and service quality, to reduce operating costs, and to respond effectively and efficiently to government regulations. Increased industry funding, complementary funding, and the use of cooperative programs and industry committees have benefited the industry--and the general public--in several areas. Vehicle-track interaction, and its impact on safety and operating efficiency, was poorly understood in 1970. Research in track train dynamics has quantified relationships and led to improved operating techniques. The design and structural integrity of tank cars has been improved in a program jointly funded by RPI and AAR, with safer handling of hazardous materials the result. New techniques for managing the industry's $10 billion investment in freight cars have been developed to assist railroads in improving utilization and reducing unnecessary handling costs. The potential value of cooperative activity with labor to improve productivity has been demonstrated. Improvements in couplers, trucks, rail and many other elements of the system have been made possible.

Future Directions

Any research program has to be constantly reassessed in terms of its direction and emphasis as conditions change and new issues arise. One such change has been the decision of the Federal Railroad Administration to reduce its support for railroad research. FRA's research budget had grown rapidly during the 1970's - from negligible levels to over $50 million in FY 1981. The FY 1983 budget now before Congress calls for $20 million in FRA research, with a concentration on safety issues. One result has been the decision to transfer the Transportation Test Center in Pueblo to private operation. The

Board of Directors of the AAR has recognized this situation and, as a result, asked me to develop a long range program of rail research which takes this into account. I presented this program to the Board at its March 25 meeting. I am pleased to tell you that the Board voted unanimously to adopt this program in principle.

In conducting the five-year planning exercise the Department surveyed the industry and shippers and reviewed past efforts undertaken by the railroad research community. From these surveys and studies a list of priority issues requiring research was developed. The major issues identified were:

- railroad costs and modal competition
- high fuel prices and susceptibility to shortages
- rail wear, corrugation and failure
- track deterioration
- wheel discolorations
- wheel failure
- defect detection
- derailment prevention
- equipment design
- employee injuries and illnesses
- environmental impacts and regulations
- labor and capital productivity

Over 100 projects designed to address these issues were identified and costs were estimated for each. Priority criteria were then applied to these projects and a recommended research program developed. This program, which calls for a significant increase in private sector research funds, has been approved in principle by the railroad industry's Research Committee and by the AAR's Board of Directors.

The program represents a significant shift in priorities from current research efforts and a conviction to continue to increase industry resources devoted to research.

The percentage distribution of industry research changes markedly under the plan. A major increase in research effort is planned to address energy issues - in particular the development of alternatives to current specifications for diesel fuels and the conduct of dynamic train resistance testing to determine techniques to improve fuel efficiency. In addition, increased attention will be devoted to the development of advanced freight train/freight car designs to respond to changing market conditions and to reduce operating and maintenance costs. A comprehensive approach to track maintenance - and its ballast, subgrade, crosstie and rail components - will be undertaken. Continued attention will be devoted to reducing personal injuries and improving freight car utilization. On the other hand, the percentage of research funds devoted to vehicle-track interaction is reduced because of the progress made in recent years. Funding for labor productivity research is also reduced because improvements now depend more on resolving institutional issues relating to labor and management than on research.

The primary focus of the program is to improve safety and to reduce costs and major benefits in these areas are anticipated.

Safety

Reducing accidents and personal injuries continues to be a major objective of research. Over the past ten years, research has contributed to impressive gains in rail safety, but further work is necessary. Among the research programs planned to provide further reductions in accidents and injuries are:

- Procedures to prevent hazardous materials spills and to improve the safe handling of spills that do occur.
- Improved on-board cab information systems to reduce the probability of accidents due to train action.
- Continued improvements in train operation simulation techniques to evaluate operating practices and derailment causes.
- Improvements in design and structure of freight cars and components.
- Continuing efforts to improve understanding of interrelationships between operating practices and equipment and track design and maintenance.
- Research into major types of personal injuries - lower back injuries in particular - and major causes such as hand tool and hand switch operations.

Cost Reduction

The second major objective research is to reduce operating expenses to improve the industry's ability to compete and to improve its financial condition. Research requirements addressing these areas include:

- Energy research programs to develop lower cost diesel fuels and improve efficiency.
- Improvements in freight car management to reduce empty car miles (with additional benefits in reduced fuel consumption)
- Research to determine the optimum life cycle of freight cars and components in order to improve the balance between physical and economic life.
- Reductions in the significant cost to the industry of replacing wheels due to overheating and brake shoe related damage
- Improving the economic life of rails and wheels by developing means of reducing wear and corrugations
- The development of comprehensive track system models to enable the optimum planning of maintenance and replacement

Long Run Research

The AAR's research program attempts to balance the need to address issues of immediate, pressing concern to the industry - such as fuel prices and the costs of replacing wheels and rail - with longer run isues and maintaining an ability to advance the general state of rail technology. Therefore while addressing crucial safety and efficiency issues, the AAR will also investigate possible improvements in such areas as:

- Advanced freight/train car equipment to address emerging markets and possibilities for reduced tare weight
- Advanced braking and coupling systems to reduce operating expenses and improve service quality
- University-based research activities in areas such as metallurgy, non-destructive evaluation, and dynamic modeling to keep the industry abreast of the current state of the art
- Preliminary evaluation of alternative motive power systems should energy price or availability issues force major changes in rail operating systems or practices

To conduct this research program the industry will use not only its own resources but also the Transportation Test Center if it is available. Further, given the reduction in Federal research, we plan to develop and utilize as much as possible centers of competence in rail research issues in universities of other institutions so that we will insure the devotion of attention to rail issues. Such a program requires that the industry provide long run commitments for research that will lead to the development of programs attracting technical expertise on a continuing basis.

Freight Car Utilization

The Committee has expressed particular interest in the issue of freight car utilization. Accordingly, I will describe this research program in greater detail. It should be recognized that there are other Research and Test programs of equal importance. This will respond to your interest and serve as an example of the organization used by the Research and Test Department to address industry problems.

Freight car utilization and freight car supply have been perennial railroad problems. In the 1970's, these problems were aggravated by increases in the costs of car ownership and car use.

In 1974 the railroad industry launched a cooperative research effort into the problem of car utilization called the Freight Car Utilization Research-Demonstration Program, jointly funded by FRA and AAR. The objective of the Program has been to help improve the productivity of the freight car fleet by identifying practices that reduce car utilization, recommending corrective changes, conducting experiments and demonstrations to test the value of such changes, and informing the rail transportation community of its findings and conclusions.

This effort was modelled after cooperative research programs in other areas. By pooling the resources of the AAR, individual railroads, suppliers, and the Federal government, such programs have achieved results that could not have been achieved by any of these groups alone. The Research and Test Department of the AAR manages the program under the guidance of a Steering Committee representing the same groups. Specific problem areas have been addressed by task forces made up of rail industry people and others, supported by a full-time program staff and selected consultants.

Over the last seven years, the program has marked several important accomplishments. I would like to describe briefly a few of them here.

1. The establishment of the General Motors Multilevel Reload Project

A six-man project team based in Detroit distributes, on a minimum cost basis nationwide over several participating railroads, the empty multilevel auto rack cars which are used to carry finished GM automobiles from assembly plants to dealers. Before the project started in 1979, these cars normally returned empty to their previously assigned loading points, thus generating almost as much empty mileage as loaded mileage. The project team now distributes these empty cars to assembly plants closer than their previous loading points using a linear programming technique.

In the 1980 model year, the project saved approximately 40 million empty car miles and 150,000 car days of empty movement, for an estimated annual dollar saving of $17 million. The success of the GM project led in 1980 to the establishment of a similar project in Detroit for cars assigned to Ford Motor Company. For the 1981 model year, that project saved 8 million empty car miles and expects to save about 22 million car miles in 1982.

By the end of 1982, the GM and Ford projects will encompass almost all the 20,000 or so multilevel cars assigned to GM and Ford in the continental U.S. These projects have now become a routine part of the industry's operations under the supervision of a committee made up of representatives from the participating railroads. The Freight Car Utilization Program is now working to establish similar project in other car types.

2. The railroad industry's adoption of Hourly Car Hire

Until 1978 railroads paid a daily rental or per diem for the use of each other's cars based on where the car was at midnight. This practice led railroads to rush cars to interchange points and off their lines before midnight to avoid the rental charge. The result was midnight congestion and delay in major terminals.

The Freight Car Utilization Program spearheaded an industry study that documented the costs of this congestion and led to the adoption of car hire paid on an hourly basis. Since then, the phenomenon of midnight congestion has disappeared, and railroads are now less constrained in their train scheduling.

3. Support for the railroad industry's improvements to its car service system

Since its inception, this program has conducted studies and carried out development work to help improve the industry's system of car service rules, orders, and directives. This work has included:

> A study of Car Service Rules Orders and Directives that showed that the old Car Service Rules tended to reduce car utilization. The industry, effective July 1981, liberalized its Car Service Rules to permit unconstrained loading of cars by non-owning railroads unless the cars are covered by an AAR directive. Usig the TRAIN II data, the program will also evaluate the impact of these new rules on car utilization when a car shortage arises.
>
> The development of a nationwide car grading system through TRAIN II. This system will provide valuable information on the grade of quality of each plain boxcar in the national fleet. The AAR will use this information when issuing directives, and railroads may use it internally when matching cars with orders.

The program is also developing systems to predict as well as evaluate the impacts of various rules and directives on car utilization.

4. The development and use of "Operations/Service Planning"

The Freight Car Utilization Program sponsored the Massachusetts Institute of Technology to work closely with the Boston & Maine Railroad in the development and use of relatively new techniques for planning and controlling operations on individual railroads. These techniques differ from traditional methods of operating in that they are directed by an interdepartmental committee with the help of a computerized network model called the Service Planning Model. This model quantifies trade-offs among operating startegies. It also permits improved monitoring of the service provided to the railroad's customers.

Employing these and other techniques to change its operations, the Boston & Maine estimates that it saved $3 million (3 percent of its gross revenue) in car costs in 1979 alone. It also credits the program-associated work with helping it emerge from bankruptcy, which it expects to do this month.

With program funding, MIT has enhanced this very complex model to run on a desk-top microcomputer that costs about $6000. In this configuration, the model has been transferred to four other railroads (Burlington Northern, Illinois Central Gulf, Southern Pacific, and Conrail). Still other railroads have expressed significant interest. The program expects to continue adding to and promoting this system.

5. Focusing the railroad industry's attention on car management

Perhaps the most important task of the program has been to stimulate and promote the development of new concepts in freight car utilization and freight car management. It has done this through numerous reports, through seminars, and through articles in the trade press.

As a result of the program's continuing efforts, several railroads, notably the Illinois Central Gulf Railroad and Milwaukee Road, have established groups responsible for car management within their respective companies. All report good results in reducing costs associated with car ownership, car hire, and empty car mileage.

In April 1981, the program went through a reassessment process which reaffirmed its value to the industry and mandated a continued high profile research effort. The mandate also called for a closer working relationship with the industry's standing committees and with the other AAR Departments so that research and practice might be tied more closely together.

The program's objectives over the next five years include:

- further development of systems to evaluate new car service rules, orders, and directives.
- development and implementation of arrangements to cut down on the extensive cross-hauling of empty cars during periods of car surplus
- development of multilevel-type projects in other car types
- promotion of techniques for allocating, budgeting and controlling car costs
- further enhancement, promotion, and use of the Service Planning Model
- an evaluation of the utilization problems associated with intermodal equipment, and
- the development and dissemination of improved techniques for training field personnel in the importance of car management.

Role of Government

The railroad industry has enjoyed a productive relationship with government as a cooperative research partner in such programs as Freight Car Utilization and Track/Train Dynamics. FRA has jointly funded these programs. We recognize that the federal government can no longer be counted on as a major source of funding for such cooperative programs. However, the success of many of the programs in this research plan will depend upon continued government cooperation and participation.

For example, a major element of our safety research program is to develop an improved data system in order to improve our understanding of the causes of safety problems. This requires an industry-government cooperative effort to improve FRA's accident and casualty reporting system. The industry uses this data system to monitor trends and identify potential problems in train accidents and employee casualties. Thus, it is an important source for the identification of safety research needs. The present FRA system has been improved significantly since its adoption in 1975. However, there is a need for further improvement if we are to take full advantage of its potential.

Most of the major programs in the 5-year research plan are safety related. Many of these, including Track and Structures, Vehicle/Track Interaction, and Freight Car/Train Equipment have major field test phases which could be conducted at the Transportation Test Center (TTC) in Pueblo, Colorado more efficiently and effectively than in other locations. Projects such as brake system performance tests, vehicle/track interaction tests, and track system performance tests can be conducted more efficiently and economically at TTC because:

- The test environment can be more closely controlled (e.g., no interference from revenue trains), and
- There is better access to technical support and maintenance facilities for test equipment.

Thus, the TTC can play an important role in the railroad industry's research and test programs. Accordingly, the industry would prefer to see this facility continue to operate. The FRA has recommended that the operation of TTC be transferred to the private sector. We sincerely hope that this transfer will be achieved in a way that will enable the uninterrupted operation of the facility and continued access by the railroad industry. We have indicated to FRA the circumstances under which the AAR would be willing to undertake the management of the TTC.

The railroad industry supports the principle of reduced government involvement in private sector activities. We believe this concept should be extended consistently and uniformly with regard to all sectors of transportation. We appreciate that the achievement of such consistency and uniformity is complex and demanding. One particular concern we have in that regard is the imbalance between public research funding for the railroad industry and public research funding for our competitors. The recent dramatic cut-backs in federal funding for railroad research have emphasized this imbalance. For now that the railroad industry is, more than ever, on its own for such research, we view with growing concern the continuing flow of public funding which benefits the trucking and barge industries.

The Relationship to High-Speed Rail Systems and Advanced Rail Technology

The Committee has heard or will hear of the dramatic differences in United States rail passenger service from that available in many highly developed industrial countries, such as France, Japan, and Great Britain. The impressive train speeds achieved by TGV, Bullet Trains, or Intercity 125 HST's represent the state-of-the-art in high speed technology. The applicability of such technology to United States rail passenger markets is subject to considerable debate. We know, of course, that there are significant differences in the nature of the passenger markets in the United States in comparison with France, England, and Japan. There are differences in distance and density. Moreover, in contrast to France, England, and Japan, the United States Congress many years ago elected to fund the extensive Interstate Highway network rather than subsidize major improvements to the rail passenger carrying system. As a result, both air and highway modes offer very attractive alternatives to rail for inter-city passenger travel.

Furthermore, our long distance passenger system shares rights of way with much heavier freight movements. From a public policy standpoint, decisions concerning high-speed technology--and the investment in research into such technology must be made on quite different bases from those used by the freight railroads to determine research priorities and capital spending. High speed rail passenger service involves more than high speed train technology. Railroads are systems which depend on and are constrained by the interaction of trains with each other and the configuration and structure of the tracks over which they operate. Probably the most difficult of these interactions to deal with are those that relate to operating trains of widely differing speeds over the same route or track. In fact, many high speed systems, such as TGV in France and Bullet Trains in Japan, do their high speed running on tracks dedicated to identical equipment operating at common speeds. It is a public policy question whether to build such rail systems or, for instance, interstate highways. But it is fair neither to the freight railroads nor to Amtrak and its passengers to expect to operate high speed passenger trains on track which carries a preponderance of much slower freight trains.

You will note that in the industry's listing of major issues developed to guide the assessment of research needs, high speed ground systems were not mentioned. Our studies indicate that the competitive problems facing the industry are not related to the speed of service over the road, but to the reliability of service, to the ability to move single carload shipments, and to the cost of rail transportation in relation to other modes. Therefore, our research emphasis is placed on improving service reliability by reducing line-of-road failures, improving terminal operations and information exchange, and reducing rail costs in order to better compete with alternative modes and to generate earnings necessary for capital improvements and new technologies.

For the U.S. rail freight industry, advanced rail technology means maximizing the use of computers, developing metallurgical techniques to extend the economic life of rails and wheels, designing new freight train equipment to meet shipper requirements and reduce expenses, and developing track and equipment designs which will improve the safety and efficiency of service.

The policy of the AAR Research and Test Department has been to engage only in research which is of value to a significant portion of its members, leaving to individual carriers the responsibility for research and testing which is applicable only to those carriers and to the supply industry responsible for specific product development. Thus, while Amtrak is an AAR member, and is represented on the AAR Research Committee, it would be inappropriate for AAR to expend industry resources on the development of high speed passenger trains, per se since they are of limited relevance to the majority of the industry. On the other hand, much of our research is directed at many problems common to both the freight hauling railroads and to Amtrak such as rail, wheel, track structure, and dynamic response. In the broadest sense, all of our work is aimed at improving the safety and effectiveness of rail transport. Rail passenger service is a major beneficiary of such efforts.

Programs in metallurgy to extend rail and wheel life and reduce or detect failures directly benefit both freight and passenger service by improving safety and efficiency. Especially now that Amtrak is a track owner and is confronted with the same maintenance of way problems as are other railroads which operate trackage jointly used by passenger and freight trains, the entire Track Research program discussed earlier is as applicable to Amtrak as any other carrier. Similarly, the train, locomotive, and car computer simulation programs developed under Track/Train Dynamics are available and applicable to passenger service. Our work in employee safety and energy is also of mutual benefit to Amtrak and the freight railroads.

Finally, the AAR Board of Directors has authorized, as part of its recognition of the need for extended private sector railroad research, negotiation which, if successful, would lead to AAR management of the Transportation Test Center. This facility and our two laboratories in Chicago have test equipment and facilities which would be available for use by Amtrak or any other railroad. The metallurgy laboratory in Chicago has been utilized by Amtrak for certification of rail weldments and investigation of rail failures. The high speed railroad test track or any other of the test tracks and the Rail Dynamics Laboratory of TTC are now, under FRA management, and would be, under AAR management, available to Amtrak or UMPTA in a similar fashion. Therefore, there is considerable community of interest between freight railroads and passenger service despite the economic and institutional differences in the approach to high speed ground transportation. In the past this joint interest has been recognized in the operation of the Transportation Test Center and in Amtrak's full participation in guiding the industry's research program. As the private investment in rail research increases, this community of interest should be recognized in the consistent development of research centers which would develop the capability to address a broad range of rail issues. Many of these issues are relevant to both high speed and conventional rail service, and their resolution is crucial to the safety and effectiveness of both.

Mr. **Meetze**. I am Henry Meetze, president, RAILINC Corp., a wholly owned subsidiary of the Association of American Railroads.

My purpose is to give you an overview of a system called TRAIN, which is operated and maintained by my company for the freight railroad industry.

The original version of TRAIN—incidentally that stands for TeleRail Automated Information Network—came into being in 1970 and allowed interchange data to be collected electronically by the AAR from the freight railroads.

An interchange occurs when a railroad car changes hands from one carrier to another.

TRAIN underwent rather extensive revision in 1975 and the resulting system is the one that I would like to describe to you. The system consists basically of four components. First, the industry's national communications network, which is the backbone of the TRAIN system.

This network has grown rather rapidly from a combination of railroad microwave and simple commercial circuits into an all-commercial complex terrestrial and satellite network that spans the United States and allows us to communicate with railroads in Canada. We have most recently instituted a communications link into Mexico. From the original three circuits we had in 1970, we now have 94.

The second component of the system is one of two large scale computers in my company which is used to operate the network. The second computer is used principally for data processing support for the Association of American Railroads staff and backup for the network computer.

The third component is a large computer in each of the freight railroads. We have a total of 44 railroads that are connected to our computer network and a variety of shippers, including General Motors, Ford, and Du Pont. We also have four commercial service bureaus connected to the network.

What do we do with the facilities? We collect data on the movement of freight cars throughout the United States. We also collect data on the changes in physical characteristics of the cars and usage data on the cars. We collect over 20 different types of car movement information, and this results in about one million transactions or movements being reported to us each day in a good business year.

Right now we are running around 750,000 a day. These data represent the TRAIN system's fourth component.

Certain types of movements automatically trigger messages back out to the railroads themselves. One such message is a junction advice, which is used for freight car accounting.

Typically we provide about 6.7 million such electronic junction advices to railroads and other car owners monthly. We keep this incoming car movement data on three large automated files located within my company.

The first file is the freight car master which contains the last four reported moves of every freight car in the United States. It also has information on cars in Mexico and Canada. We have another data base called Umler, a universal machine language equipment register. This essentially contains the physical characteristics of freight cars, trailers, and containers and also per diem and mileage costs on the same. The third data base is called the car service data base, and is used for the car service function at the AAR. This data allows the AAR to effectively reallocate freight cars between railroads, principally in times of car shortage. We allow certain people to inquire against these data bases and handle about 7,000 inquiries a day on about 50,000 cars.

In addition to the car distribution function which has been for some time the main purpose of the TRAIN system, we do a variety of other things with the data. We have a subsystem called the interchange continuity system which was put into production in 1978. It was developed as a means to determine and improve the accuracy of reporting interchange data between railroads. For instance, a delivering car might report that it gave a certain freight car to another road at 4 p.m. and the receiving road might have reported that it received it at 5 p.m. The interchange continuity system allows individual railroads to concentrate on those areas and types of reports that are most in error. When we began the system in 1978, the percentage of accurate receipts and deliveries was running around 78 percent. It is now running 92 percent with a resulting significant decrease in unnecessary administrative work.

Because we have computers connected to the communications network, we are able to transmit messages from one computer to another, and this is called message switching. This is probably the area with the greatest growth potential as far as the entire TRAIN system is concerned.

For example, we transmit waybill data from one railroad to another. This was the original application of message switching and began several years ago. Most recently we have been transmitting car location messages from individual railroads to their customer shippers.

At the beginning of 1981 we were transmitting about 4,000 messages a day. At the end of 1981, around 40,000 messages a day and we expect this to increase throughout 1982.

The elimination of paper billing between carriers and shippers is a recent application which is indicative of many more to come. Several roads are now electronically providing their customers with bills of lading automatically prepared as the waybill is prepared. Freight bills are also automatically prepared and mailed the same day. We ultimately expect these freight bills to be electronically transmitted as well.

This, gentlemen, concludes my summary of the TRAIN system. We would be happy to answer any questions you might have.

[The prepared statement of Mr. Meetze follows:]

Testimony to be provided by
Henry W. Meetze, President
RAILINC Corporation
to
Rail Research & Development
House Science & Technology Subcommittee

TRAIN II BRIEFING

I am Henry W. Meetze, President, RAILINC Corporation, a wholly owned subsidiary of the Association of American Railroads. My company provides data processing and telecommunications services to the railroad industry and to the AAR. The purpose of this briefing is to provide an overview of the TRAIN system, what it consists of and what it does.

During the pre-1970's, the railroad industry concerned itself with automating local internal functions involved in rudimentary accounting and billing applications. In the late 1960's and early 70's most railroads were using some form of automation to track their fleets on an individual basis. As you know, each railroad has its own communication facilities which enable it to maintain visibility of its fleet within its own territory. However, when a freight car moves outside of a railroad's own territory, that road loses knowledge of its whereabouts. From this problem stemmed the need for national visibility, as the majority of rail revenues come from freight cars which are handled by two or more railroads.

Let us look at the scope of U.S. rail operations. You can see that within the United States we must track 2-1/4 million cars, trailers, and containers on 326,000 miles of track and we are approaching 1 trillion ton miles per year of revenue traffic. This need resulted in a system called TRAIN (TeleRail Automated Information Network) (1970) which relied upon a basic data communications network connecting the AAR and major rail carriers.

Interchange data only was collected using these facilities. An interchange occurs when a freight car changes hands from one railroad to another. TRAIN I was quickly replaced by a more comprehensive version, called TRAIN II, which became operational in 1975. TRAIN II came into being as a result of action by the AAR Board of Directors to undertake a study to design an improved National Car Management Information and Car Distribution System. The original TRAIN II study envisioned a large number of uses for the system; although car distribution was to continue to be the primary function of TRAIN. The system, while fulfilling many of its original Car Service objectives, has grown rapidly over the past several years in uses outside car distribution, all of which were forecast by the original system study.

The industry's national communication network is the backbone of the TRAIN system. This network has grown rapidly from a combination of railroad microwave and simple commercial circuits toward an all-commercial, complex terrestrial and satellite network across the majority of the United States and, as you note on the slide, into Canada. Most recently, we have installed a communications line linking RAILINC with the National Railway of Mexico, in Mexico City. The red dots indicate cities where computers are located that are connected into the network. Within these dots are located 44 railroads and private car companies, 7 shippers, and 5 commercial time-sharing bureaus. From the original 3 circuits in 1970, the network now has a total of 94. RAILINC maintains a technical control facility in Washington that monitors all lines 24 hours a day, 7 days a week, 365 days a year.

Let us look first at the facilities which make up TRAIN. At RAILINC in Washington, we have two large-scale IBM computers. One is connected to and operates the industry's national data communication network. The second is used principally for data processing work and supports the AAR staff while acting as a backup for the TRAIN computer. Each major railroad has one of its large corporate computers connected to the network. Our communications facilities tie these computers together into a integrated system.

Now what do we do with all this? Well, for one thing, we receive and store data pertaining to the location of freight cars, their physical characteristics and usage costs at the AAR. In fact, over 20 different types of car movements are continuously reported from roads to us....over 1 million total movements per day. These car movements include interchange reports, regional boundary crossings, placement of a car into storage or a maintenance shop and even arrivals and departures at customer locations. Certain types of these movements, when received by us, automatically trigger messages out to other railroads and car owners. We automatically generate 19 types of messages in this manner, three of which are shown on this slide. I will highlight just the first two. Junction advices are official records of interchange and are sent to the owner of a car when an interchange occurs that does not involve him. These junction advices are used for accounting purposes and allow the car owner to keep track of rentals and car location. The industry's ability to transmit them electronically has eliminated tedious clerical procedures and paper handling within roads. Typically we provide 6.7 million such electronic junction advices to railroads and other car owners monthly.

An on-coming car report is generated as a result of either of two movement reports received by TRAIN. This data is provided to the railroad shown as the next connecting carrier. Here, we electronically furnish some 1.4 million on-coming car reports monthly to those roads which have computers attached to the network.

We keep incoming car movement data on three large automated files. These files are illustrated on this next slide. From left to right, they are the Freight Car Master, which contains the last four movements of every freight car in the U.S., Mexico and Canada (we also have access to history tapes going back 7 years); the Car Service data base used for the car service function at the AAR. I will touch on this function in more detail shortly; and the UMLER (Universal Machine Language Equipment Register) data base, which is the Official Registry of railroad cars, and contains physical characteristics of freight cars, trailers, and containers, and per diem/mileage costs on the same.

The TRAIN system also allows interested organizations to inquire against two of these data bases - the Freight Car Master and UMLER. We handle approximately 7,000 inquiries per day involving about 50,000 cars. The four types of inquiries we support are shown on this next slide. Access to each of these types of data is controlled by rigid criteria established by the railroad industry.

Let us look now at how these data are used. As I mentioned earlier, the car distribution function has been for some time the major use of the system. It is performed by the AAR's Transportation Division and consists of re-allocating freight cars between railroads, principally in times of car shortage. Such a shortage may temporarily occur during particular seasons, for instance, the Mid-West grain harvest. The Transportation Division, by analyzing car location data, would direct one or more railroads with a surplus of the required cars to provide a certain number of these cars to needy roads on a temporary basis, using priorities established by the industry.

I'll skip over numbers 2 and 3 (Special Publications and Special Studies) which are self-explanatory, and move to ICS, or Interchange Continuity System, which was put into production in 1978. It was developed as a means to determine and improve the accuracy of reporting interchanges between railroads. For instance, a delivering road might report that it gave a certain freight car to another road at 4:00pm on a particular day. The receiving road, on the other hand, might report that the car was received at 5:00pm. Reconciliation of this discrepancy at a later date causes untold amounts of administrative work. ICS automatically analyzes receipts and deliveries and allows roads to concentrate on eliminating errors at those locations where most trouble occurs. Prior to ICS, the percentage of accurate receipts and deliveries reported to TRAIN ran around 71% (Jan. '78). It is now running 92%, with the resulting significant decrease in unnecessary administrative work. There are many roads that state unequivocally that ICS alone is worth the price of maintaining the entire TRAIN system.

Because we have selected movement data reported to us by the roads, we can reconstitute their files in the event of a disaster or unanticipated loss of data at their facilities. There are several roads who have asked for and received this backup service within the past two years.

We now move from data and come to the final use of TRAIN II's facilities - message switching - which is probably the one with the most growth potential. Message switching involves using one computer to receive a message electronically from another computer and transmit that message to a third computer in fractions of a second. When cars change hands in interchange, a piece of paper used for control and billing purposes, called a waybill, is normally given to the receiving road from the delivering road. It seemed only natural, therefore, that the industry selected waybill exchange as its first major message switching application. This exchange began in 1978 between ConRail and the Missouri Pacific. Currently there are 9 roads that are involved in waybill exchange. By the end of 1982, a total of 85% of all loaded interline traffic will be represented in those waybills being switched. This effort, among other benefits, eliminates the need to repetitively enter waybill data into a railroad's computer each time a load passes from one railroad to another and results in significant time savings for railroad personnel.

The most dramatic growth in the message switching area has occurred within the last three years. This growth is principally in an area called Shipper Assist Message, or SAM. Under SAM, the AAR acts as an interface between rail carriers and shippers for the purpose of forwarding car location messages. These messages allow shippers to maintain visibility of their cars as they are moved by the roads. This would allow General Motors, for instance, to vary production rates at their plant facilities based upon projected arrival of parts. At the beginning of 1981, we were switching approximately 4000 messages per month, and at the end, this figure rose to 40,000. Shippers directly connected to us include GM, Ford, and DuPont. Smaller shippers, or those who do not wish to maintain a private communications line with us, use commercial service bureaus such as GE Telenet, Honeywell, and Kleinschmidt as their interface 'agent'. These bureaus service a total of over 90 shippers.

The elimination of paper billing between carriers and shippers is a recent application which is indicative of many more to come. Several roads are now electronically providing their customers with bills of lading automatically prepared as the road's waybill is prepared. Freight bills are also automatically prepared and mailed the same day. Ultimately, these bills will also be rendered electronically.

This morning I have given you an overview of the TRAIN system - what it is and what it does. In several areas, only examples were mentioned - there are many other applications which are equally impressive, but, because of time constraints, have been left unsaid. There are a few points I would like to leave you with: first, that TRAIN is an extraordinary system - very large, very complex, that it serves every AAR member road and many other organizations, as well; that it is being used for a multitude of purposes, all of which were foreseen back in the early 1970's by men with a great deal of vision; and, finally, that, the more it is used, the better it gets and the bigger its payoff to the railroad industry and their customers.

Mr. GLICKMAN. Thank you very much. I am intrigued by the modernization you have made in the area of shipping and billing which is something I was not particularly personally aware of before. It may be something we want to explore a little later. My Dad and family are in the scrap iron business and still use the railroads. They are big customers of the railroads. The whole concept of billing and shipping was something I always felt was in the Stone Age. It looks like you are making significant progress.

I would like to ask Dr. Harris a couple of questions.

Your testimony infers that significant cutbacks in Federal Railroad R. & D.—and, as you state in your testimony, there was a cutback from $50 million in fiscal year 1981 to $10 million—will place greater requirements on the AAR and its members to finance and conduct research.

Do you believe you will be able to carry on the kind of research that is being cut back fairly dramatically by the Federal Government?

Mr. HARRIS. Yes, I believe we will be. I think our research can be somewhat more efficient than that of the Federal Government simply because of the procurement process FRA has to go through in terms of identifying potential sponsors.

Often they have to bring people into their research program with no previous experience. They tend to have had over the years a good program, but a program that hasn't been as efficient as one in which we can select more precisely the people we know are competent to carry out the work and thus gain the advantage of increased experience on the part of contractors.

Mr. GLICKMAN. What kind of an increase in dollars are you going to put in?

Dr. HARRIS. The AAR contemplates an increase in dollars in the range of $6 or $7 million over the next 2 or 3 years.

Mr. GLICKMAN. Is that $6 or $7 million a year or over a 2-year period?

Dr. HARRIS. Eventually $6 or $7 million per year over our present program. I don't have a blank check and a signature on that blank check, but there is a commitment in principle to an increase of that order of magnitude made only last week.

I am very encouraged by it because it represents a real commitment on the part of the AAR Board to picking up that part of the slack brought about by the decrease in the FRA program.

We defined the high priority problems and how much it would take to attack those problems. The board said they would be in a position to fund that increase in research.

Mr. GLICKMAN. The administration has pretty much decided to eliminate most research other than safety.

Dr. HARRIS. Yes, sir. That is quite understandable.

Mr. GLICKMAN. What do you feel is the proper role for the Federal Government regarding rail research and development?

Dr. HARRIS. Congressman Glickman, I have been in the Federal Government as a civil servant many years ago and in service during World War II. I have been close to the Federal Government. I have been in Washington for most of my professional career, working variously at the National Academy of Sciences and other research institutions that did have Federal funding. Now that I have been with the railroads for about 12 years, I believe that the industry, given the kinds of rate freedom that the Staggers Act permits, will, in fact, be able to carry on its own research and I think it probably should.

I think there is some difficulty in translation of our problems to an institution in the Federal Government to carry out programs intended to serve our needs.

While we have benefited—no question about it—from the investment Congress has permitted FRA to make in research, I think it is the responsibility of the industry to carry out that program and I think that in the long run that is a better solution to the problem, even though it is a little hard to get as many dollars now as we have had in the immediate past.

Mr. GLICKMAN. Let's take a specific example, the transportation test center in Pueblo, Col.

The administration, I believe, has indicated its intent to end its operation of that facility. I think that some negotiations have been going on between the FRA and the private sector. Perhaps it is with the AAR to take over the TTC. You talked about that. You said you would answer any questions. What is the status of that?

Dr. HARRIS. We are in the process of negotiation toward the possible assumption of management responsibility for the transportation test center. We are not attempting to acquire title to the test center. Title would remain with the FRA and the State as appropriate. We would be the operator of the test center.

In this instance the remoteness of the center and the high overhead costs associated with it will require some continued input of Federal testing dollars to be performed there to augment the dollars that I can afford to put at the test center.

That combination will reduce substantially the Federal investment of the past years in the test center and allow us to operate the center effectively on behalf of our mutual interests. We have had many cooperative programs with the FRA in the past. We can continue those in the future.

Mr. GLICKMAN. When do you think an agreement will be reached in this regard?

Dr. HARRIS. We are in the middle stages of negotiation. I am very hopeful that within the next week or 10 days we will know whether or not the negotiations are going to go ahead successfully. If they are, there is no reason we can't conclude those in a matter of several weeks.

Mr. GLICKMAN. Thank you.

Dr. HARRIS. I am encouraged by the status of negotiations at the present time.

Mr. GLICKMAN. I have a final question. The implication of both your testimony is that there has been a lot of modernization in the freight side of the picture, which is where your proprietary interests are. You gave up on the passenger side some years back. You have heard testimony today primarily from the French representative. Tomorrow the Japanese representative will testify.

Do you believe that this country can, in fact, develop a national rail passenger system that will be similar to what the Japanese and French have developed in connection with the bullet train, the TGV and other trains traveling throughout the world?

Dr. **Harris**. There is no question in my mind that we can develop that technology. That technology requires several things, however. It requires a separate track structure.

Mixing heavy freight and those kinds of high speed traffic has not proved to be satisfactory. Indeed, as the Japanese may indicate to you, the Shinkansen was designed to run freight at night and passenger trains during the day.

Because they require all night to tune the track, to put it back in a mode where it can accept the high speed passenger service in the morning, they have not been able to run freight at night. This same is true surely with the TGV. I know people who developed the TGV system. They assured me there is no way they can accommodate heavy freight on that line.

I say unequivocally that high-speed passenger technology could be developed. The whole question is the economics of the problem. If you look at the Japanese and French systems, I think you will find that they are not operated in an economic mode which is compatible with the private sector investment pattern, despite the fact there were some U.S. loans made available to France. I don't know the conditions and the guarantees that were made to attract that U.S. investment capital.

The amount of subsidy that is required in all other passenger systems around the world is very, very large. It would I suppose take $10 billion or $15 billion or more of subsidies to create a national high speed rail passenger network. These costs could not be recovered in the fare box. In the freight passenger system in this country we have to recover that investment out of the rates that we charge to shippers.

So it is a matter of policy as to whether or not that kind of a major public investment should be made for a high speed rail network.

The same is surely true, as you know, on the Washington Metro System. I served on a committee looking at the fare structure of Metro. Surely the fares have gone up, as Congressman Winn indicated. They still recover less than half of the operating costs of that system through fares. The burden on the counties in terms of using tax revenue to support the operating costs is great. The Federal Government has underwritten most of the construction costs. It provides a marvelous public system, no question about it, but the costs are high.

Whether or not that kind of investment should be made in a high speed passenger system is a question that has to be decided on public policy grounds. Obviously I have substantial concerns about what happens years into a program when suddenly you find the fare box is not collecting operating costs. At that time there is a large debt structure behind the system. These are very serious economic problems that I think need to be confronted.

I surely mean to take nothing away from the people who are enthusiastic about high-speed passenger technology and how it can serve the people, but the economic issues are ones that are of profound concern to me, not the technological issues.

Mr. **Glickman**. Mr. Winn?

Mr. WINN. Dr. Harris, you mentioned some new types of fuel in your research. Are these new or less expensive or a combination of fuels? What are you talking about?

Dr. HARRIS. Congressman Winn, the diesel electric locomotives we operate in this country are designed to operate on a grade of diesel fuel called number 2. It has rather specific chemical limitations and combustion limitations. That fuel is very desirable because it minimizes wear in the locomotive engine and provides for very efficient operation of the locomotive.

We are looking, however, at adding alcohol, which may be available from a different set of sources to offset the import of petroleum.

We are looking at lower grades of the distillate that comes from the refineries at much lower cost to see whether some blends of those with number 2 diesel fuel could be introduced in the engine and allow the engine to operate successfully without any change in its environmental characteristics and without major change in its wear characteristics.

We believe we can take a wider range of fuels than heretofore have been utilized and be ready to accept any of the synthetic fuels should they come onstream—so that we can make the diesel electric locomotive continue to be effective with a much broader cut of fuels than heretofore has been the case.

One objective surely is to try to reduce costs. We believe we can do that.

Mr. WINN. Have you actually done this, had trial runs with locomotives on combinations of these fuels?

Dr. HARRIS. We established at the Southwest Research Institute in San Antonio, a very fine not-for-profit research organization, a locomotive engine laboratory to extend their already good combustion laboratory.

With the help of the builders, the railroads, and some funding from ourselves, we put two full-scale locomotive engines there which are carefully instrumented. We have run a variety of fuels and will be very substantially expanding our program for running a variety of fuels in those engines.

When we have good results from them, we will turn over those operations either to some locomotives that run at the transportation test center at Pueblo or to line haul service so as to prove the point.

Mr. WINN. Are you encouraged by the early results?

Dr. HARRIS. We are very encouraged. We know the range of methanol content it is now possible to use. We have had good success mixing Number 2 with Number 6 diesel fuel for short runs. We don't have the wear experience so as to make a final recommendation yet to the industry, but we are encouraged.

Mr. WINN. What has been the effect of your research efforts on improving the safety of rail transportation?

Dr. HARRIS. The effort we have made in tank car safety has had a major contribution. On the average there were six or seven major violent ruptures of tank cars per year over the past 15 years. That has now gone to zero.

I believe it will stay at zero. That is because we have added couplers that do not uncouple during a derailment; head shields to eliminate the tendency to puncture the head; and insulation such if a tank car is in a fire, it will vent its product before the material is overheated by the thermal environment that leads to the violent rupture process.

In the dynamic stability area, I believe the work we have done in assisting railroads better to instruct locomotive engineers in terms of handling these very complicated trains they are asked to handle today has been extremely helpful.

Now all railroads have in one form or another adopted the guidelines that come out of the research done collectivey by the industry and ourselves.

We have looked at nondestructive inspection improvements. I believe a significant reduction has occurred in wheel failures as a consequence of our better understanding of the required performance of wheels and the response of the suppliers to the new specifications that have been adopted, based on our work.

The same is true in other areas of technolgoy. These programs have made a contribution to the reduction in accidents, fatalities, and injuries in the railroad industry. There has been something like a 30-percent decrease in railroad accidents, injuries and in fatalities of railroad employees. That record can never be good enough.

Mr. **Winn**. What type of advanced freight train car equipment research are you considering?

Dr. **Harris**. The work that I am directly responsible for has to do with a proposed set of specifications for an improved car which is dynamically more stable and which puts a lower dynamic load onto the track.

Mr. **Winn**. Is this for freight only?

Dr. **Harris**. For freight only. The principles are applicable elsewhere. Cars have been designed to that specification. We are trying to arrange to procure them now for tests. We believe they will be safer and that they will reduce the amount of maintenance required for track while still carrying the 100-ton loads we think are important for effective economics in operation of trains.

There are additional concepts of cars that we will describe in new specifications, but they are not fully formulated. They will be during the next year.

Mr. **Winn**. Do you agree with the statement made earlier this morning by one of the witnesses that it is practically impossible for—you touched on this just a minute ago, just briefly—passenger trains and freight trains to travel on the same line?

Dr. **Harris**. Let me say it this way——

Mr. **Winn**. I think you made the statement that the super speed trains couldn't. I think we understand that, but can a regular passenger train like we have these days travel efficiently on a freight line?

Dr. **Harris**. In regions of the country where there are relatively small numbers of passenger trains that operate at moderate speeds it surely is possible to accommodate those within an envelope of freight train operations.

There are some difficulties. You have to set freight trains off so as to allow the passenger train to go through to meet its schedules, and so forth.

In terms of the technical issue, that is whether the track structure is compatible for both freight and passenger, the railroads have long experience in operating both sets of trains on the same track and we now have substantial experience in operating Amtrak passenger and freight trains on the same track.

When the frequency even of those moderate speed trains goes up, then it becomes increasingly difficult to achieve compatible operations between a slower freight train and a higher speed passenger train. When the speed goes up to, say 125 miles an hour or more, it is, I believe, impossible to have a mixed system.

The time of occupancy of the track is not compatible for slower freights and high-speed passenger trains. Far more important, the quality of track required for that high speed passenger train is simply exquisite, jewel-like in quality. No question a heavy freight train changes the characteristics of the track in a way which would make the ride quite unsatisfactory.

With high-speed trains you cannot have grade crossings. You have to have barriers so people won't get on the track and you can't have passing trains because of the possibility of shifted loads.

Mr. WINN. The possibility of what?

Dr. HARRIS. Shifted loads.

I see no way in which the really high-speed passenger trains can operate on a right-of-way which also serves freight trains.

Mr. WINN. Thank you very much, Doctor.

Mr. GLICKMAN. Just one final question.

It is a little related to what you are talking about. I have been concerned for some time about the FRA's safety program. I wonder if you might comment on the current safety program and their new safety system plan? If this is not your bailiwick, I will understand. You weren't asked to testify on this.

Dr. HARRIS. We have had an opportunity to review the FRA safety plan. In general we find it to be a responsive and competently prepared document.

I have worked very closely with the FRA in work on safety research. My associates, other vice presidents of AAR, have worked closely with them and rail labor in examining opportunities to have an adequate and proper and safety plan which still is a consistent plan with all other requirements of any such plan.

I think we have made extremely significant progress. I think all of us owe a great debt to Jim Snyder of the U.T.U. who will be testifying later in this hearing for the wisdom he has brought in our discussions on this matter.

I am very encouraged by the current leadership of FRA in regard to the safety issue. They created this opportunity for us to make common cause with the railroad Brotherhoods in doing what we both want; that is, having an effective railroad system which is also very safe.

Mr. GLICKMAN. I was one who supported the Staggers Act primarily because it gave you some fair flexibility so that you could begin to improve and restore some of the capital equipment which had been, for a variety of reasons, allowed to deteriorate.

I am just hopeful that the regulatory side of the picture matches that too.

Dr. **Harris**. We believe that we see very real progress towards progress in many parts of the regulatory system.

There are still some problems that we would like to see dealt with differently, but we are working in a constructive way toward achieving compatibility between our views, those of labor, and those of the Government.

Mr. **Glickman**. Thank you for your testimony. We will break now for lunch and come back at 1:15. Mr. Blanchette will testify at that time.

We thank Dr. Harris and Mr. Meetze for their testimony.

[Whereupon, at 12:03 p.m., the subcommittee recessed, to reconvene at 1:15 p.m., the same day.]

AFTERNOON SESSION

Mr. **Glickman**. We will commence the second part of the hearings that we started this morning. We have four witnesses this afternoon.

We have Mr. Robert Blanchette, Administrator of the Federal Railroad Administration; J.R. Snyder, national legislative director of the United Transportation Union; Milt Pikarsky, director of transportation programs, IIT Research Institute, and Mr. John C. Dwyer, vice president and general manager, locomotive marketing division, Transportation Systems Business Operations, General Electric Co.

We will start with you, Mr. Blanchette. We are delighted you are able to be here.

As I have stated this morning, unfortunately the House is not in practical session today. Some argue if we are ever in practical session, but today we are not at all. We had a few Members this morning. There will be a few more Members coming perhaps during your testimony.

We are delighted you are able to testify. You may feel free to summarize. Your entire statement will appear in the record.

STATEMENT OF ROBERT BLANCHETTE, ADMINISTRATOR, FEDERAL RAILROAD ADMINISTRATION

Mr. **Blanchette**. Thank you, Mr. Chairman.

You do have my complete testimony, which will be included with the record of these proceedings. I will note that the call of the hearing suggested a major initiative on the high-speed railroad passenger technology. For purposes of both divertissement and for advertising since we promote the railroad mode, I have put in a little vignette about the very substantial work in productivity that exists in our freight railroad system.

I think that we can take pride in the fact that we have the finest rail freight system in the world. I think we can take pride in the fact that the entire railroad system in America is operated with less than half a million employees. So I think that we have made notable strides, significant progress in our American railroad industry by laboring so mightily for American industry with a very small, relatively small number of people.

If you compare our productivity-employees to the system in other countries, we are as busy as the literal bee. We take great pride in that. At the Federal Railroad Administration we take pride also in some of the strides that we have helped the industry make in the freight area.

There are two notable things, only notable because I am personally familiar with them, they having occurred on my watch; that is the completion of an automated processing system in the Houston Port Terminal, a project to which the FRA contributed, and a car-scheduling program that is operational today on the Missouri-Pacific. I commend both of those projects to your attention and to the attention of this committee.

I think we Americans have a tendency to look across oceanic lenses to see railroads that are productive and efficient and that work. It is denigrating nothing of those foreign railroads if I suggest respectfully that people can look home and take a substantial amount of pride in what we are doing here in America, both labor and management.

So with that, Mr. Chairman, I will complete my summary and I would be delighted to answer any questions you may have.

Mr. GLICKMAN. We thank you for coming.

One of the things that we are concerned about, considering here, is the technological feasibility of operating high-speed passenger rail systems in this country, whether it be on corridor routes or whether it be on transcontinental or long-distance routes. Do you see any technological barriers to implementing those kinds of high-speed routes?

Mr. BLANCHETTE. No; the technology is there. It is existent. In fact, I think we always tended in railroading, if you excuse the metaphor, to reinvent the wheel.

It may be recalled that in 1969 the Metroliner operated on the Northeast corridor at 160 miles an hour; not kilometers, Mr. Chairman, 160 miles an hour, on a track which was specially prepared for the purpose. That is quite some time ago. That Northeast corridor today, with the terrible impediment of having to run over a mix of freight and commuter service, is nonetheless geared up for 120 miles-an-hour speed, which is in my judgment fantastic, considering the mix of service that runs on that corridor. So there is no technological impediment.

Even as we look at our friends abroad, we see the demonstration of that. We have had the technology, we have the technology. The problem we have always had with high-speed passenger service is not a technological one.

Mr. GLICKMAN. What do you see those problems being then in terms of high-speed passenger service?

Mr. BLANCHETTE. Primarily economic and environmental. It is not possible, in my judgment, to construct a railroad right-of-way at 160 miles an hour over a roadbed that operates freight service. The Japanese have demonstrated that and the French have demonstrated that. Their rights-of-way on the Shinkhansen and TGV are on solely dedicated rights-of-way.

It will then be a question in this country of whether the economics are there, and whether the environmental considerations permit the construction of a solely dedicated right-of-way.

We have recently heard of the conclusions of a Japanese-funded study looking on a solely dedicated right-of-way between San Diego and Los Angeles. I have not read that study. I do not know that it has actually been published in its entirety officially. But I shall be looking to that study very closely to see what the economic and environmental feasibility questions are.

Mr. **Glickman**. You are aware, of course, in connection with that, Amtrak's announcement last week about the establishment of the American High Speed Rail Corp., an affiliate entity with Amtrak, to explore these corridors all over America.

Mr. **Blanchette**. We have had considerable discussion with Mr. Boyd and his entourage on that subject and it has been stipulated that the feasibility will be determined by the criterion of the ability of that corporation to fund its needs privately. I think that is a good criterion. I commend Mr. Boyd for adopting it.

It is an affiliated corporation with Amtrak, but it is separately owned, it is not a public corporation. The contemplation of Amtrak's management is that the feasibility will be determined by private marketplace considerations.

Mr. **Glickman**. What do you think the proper role of the Federal Government is with regard to rail technology research and development?

Mr. **Blanchette**. Well, I think it is a complicated one, Mr. Chairman.

First, there is no doubt in my mind that the Federal Government has and does play an important contributing factor in that technology which is necessary to insure railroad safety.

We have redirected, for example, all of our current efforts at the Federal Railroad Administration into railroad safety.

I think that the role of the Federal Government in terms of funding ought not to be duplicative of the private sector. We ought not to be building prototypes of things that the private suppliers are quite capable of doing. So that I think that if we keep our thrust in the safety area, and we let those private suppliers and trade associations, et cetera, and the industry itself, ply its effort in those things which are susceptible to commercial exploitation, and with considerable dialog between those two efforts—then I think that we have struck a good balance.

Mr. **Glickman**. What R. & D. activities are you not going to be doing, let's say this year or next year, that you have been doing in the past, in light of your funding reductions and change in direction?

Mr. **Blanchette**. All of our funding will be in the safety area and I will furnish you, if you don't mind, for the record a list of the projects that are being phased out.

Mr. **Glickman**. OK, yes, we would like to have that for the record.

[The information follows:]

The Federal Railroad Administration's research and development projects terminated in fiscal year 1981 and fiscal year 1982 on the grounds that the work should be done in the private sector include intermodal equipment, classification yard design, and electrification.

Mr. **Glickman**. Are any of your safety projects being phased out?

Mr. **Blanchette**. No, sir.

Mr. **Glickman**. So as I understand it, in 1981 you had budgeted $50 million for R. & D. activities?

Mr. BLANCHETTE. I will accept your figures.

Mr. GLICKMAN. It is my understanding that the fiscal 1983 dollars were $20 million in the same general area. So what you are telling me is that all of the reductions are occurring in nonsafety-related activities?

Mr. BLANCHETTE. That is correct. Fiscal 1982 is on my mind these days, Mr. Benjamin having put it there last week. I know that figure.

We have a $29 million safety budget, including an increase of 24 safety inspectors and a $20 million research and development effort.

Now I will say that it is difficult to compare past research and development budgets with the present one because for some aberrational reason our policy office was always subsumed within the research and development field. Others can explain to you why that has happened.

So when one compares our present fiscal 1983 budget, the proposed budget for 1983, to past years to get a match, one has to subtract out those funds which were in the R. & D. budget in past years that were attributable to policy development and not really to research and development.

Mr. GLICKMAN. But you are telling me though, in terms of actual R. & D. safety-related activities, there will be no cut in those functions?

Mr. BLANCHETTE. There will be no essential cut, that is correct.

Mr. GLICKMAN. OK. I would like to go for a moment to the Pueblo Test Center which you have been operating for many years now.

Is it true that you plan to transfer that center to the AAR or some private association?

Mr. BLANCHETTE. Well, a private sector transfer, contemplating that Pueblo will remain as a going concern. Hopefully we will transfer operational responsibility for that center from the public sector to the private sector, whether that be the Association of American Railroads or some other entity. We want to accomplish the transfer in a way that assures continuity of operations at Pueblo, and in a way that insures that the transferee is able to undertake that responsibility. We are literally in the middle of negotiations on that now. So I cannot presume the conclusion, but that is our objective.

Mr. GLICKMAN. Do you do any high-speed rail testing at Pueblo?

Mr. BLANCHETTE. We have a FAST track. We do not do high speed in the sense that your question imports, we do not do high-speed technology. We have tested Amtrak equipment out there. We do have the FAST, so-called FAST track, but we are not currently testing high-speed passenger technology. We have tested it at FRA to the extent I believe of about $56 million in the past.

Mr. GLICKMAN. Do you ever think you will see the railroads back in the passenger business in America?

Mr. BLANCHETTE. I think not, Mr. Chairman. I cannot speak for them, but I should be most surprised if they found a return of capital, a rate of return in the—they, having labored so mightily to divest themselves of that operation, I should doubt that they would take an invitation back.

Mr. GLICKMAN. One of the arguments—this is veering off a bit—that the railroads raised during the Staggers Rail Act was that they needed the additional fare flexibility for capital improvement.

As you probably know, I have had some interest in your safety program as well as in the railroad's investment of this capital for safety-related things, track improvement and the like. Are you seeing any evidence that railroads are in fact putting more money back into capital improvement of track, safety-related expenditures, since the passage of the Staggers Act?

Mr. BLANCHETTE. Since the passage of the Staggers Act, of course, we have had an economic situation which is not conducive to capital investment obviously for the railroad industry. I do know that in 1981, as a result of the Economic Tax Recovery Act, a number of the railroads, including Amtrak and Conrail, took advantage of the so-called Safe Harbor Lease mechanism to replenish and rehabilitate capital.

I do not have a breakout of what has been done on a strictly safety-oriented direction but I will say this, the American railroad system is a safe system.

Mr. GLICKMAN. I guess my concern was that the statistics up through 1980 indicated increase in fatalities, increase in injuries, increase in monetary damage. We have been in contact—this did not occur just when you came into office. There may be some improvement in the last year or two.

Mr. BLANCHETTE. Dramatic improvement.

Mr. GLICKMAN. Is there such dramatic improvement?

Mr. BLANCHETTE. Yes, I will get you that. There has been an improvement which, even after adjustment for decrease in ton miles and decrease in economic activity, is still dramatic and I will furnish those figures.

[The information follows:]

During calendar year 1981, there was a marked decrease in train accidents compared to 1980, continuing a trend that began in 1979. The total number of reported railroad accidents (excluding grade crossing accidents) decreased from 8,205 in 1980 to 5,767 in 1981, a decline of about 30 percent. Total injuries from all railroad accidents decreased from 62,246 in 1980 to 52,877 in 1981, and total fatalities declined from 1,417 in 1980 to 1,283 in 1981, decreases of approximately 10 percent and 15 percent, respectively. Passenger train accidents declined from 142 in 1980 to 107 in 1981, and injuries from those accidents decreased from 126 to 11 for the same period, percentage declines of about 25 percent and 91 percent, respectively. Hazardous materials releases reported to FRA decreased from 118 in 1980 to 77 in 1981, approximately a 35 percent decline. The industry's record is good even when adjustments are made to reflect the two factors. First, total train miles nationwide declined in 1981 to about 676 million from approximately 718 million in 1980, a 5.8 percent decline. In addition, the dollar damage threshold for reportable accidents increased from $2,900 to $3,700 to reflect inflation.

After the necessary adjustments, accidents declined by about 24 percent, and injuries and fatalities decreased by about 10 percent, between 1980 and 1981.

Mr. GLICKMAN. To what do you attribute the improvement?

Mr. BLANCHETTE. Well, I would like to think in large measure to some of the efforts that we have worked on with the railroads cooperatively. For example, the FRA sat down with the Louisville & Nashville and the Illinois Central Railroads and noted on a systemwide assessment some problem areas.

The management there was exceedingly cooperative and worked with our people to iron out some of these problems. As a result, those two railroads really have shown fantastic improvement in the last year. Now I recognize, and I am sure you know, that one tank car explosion someplace skews the statistics and we do as best we can to standardize and normalize the statistics.

We have also tried to bring about, and I think we have been successful, a more cooperative attitude between labor and management. This year we were able to announce that labor and management had in essence collectively bargained a change in the safety regulations in three major areas, and we are working very hard with labor and management to see whether or not that collective bargaining aspect of it, rather than the traffic cop and the adversary relationship, can be improved upon. I am very hopeful on that.

One thing is clear to me, Mr. Chairman, that labor and management want a safer environment. It is no help to either management or labor to have unsafe conditions. And it is also clear to me that these are men and women of exceeding good will. I would hope as we move along these fronts of labor-management cooperation, systemwide assessments on railroads, that we will see a continuing marked improvement in railroad statistics.

Mr. GLICKMAN. Do you plan to continue your system assessments?

Mr. BLANCHETTE. Yes.

Mr. GLICKMAN. Are you going to do any more this year?

Mr. BLANCHETTE. Yes.

Mr. GLICKMAN. This is when you go into a particular railroad and you analyze the complete operation.

Mr. BLANCHETTE. That is correct.

In essence, the L. & N. and ICG was a pilot program, if you will, undertaken by the Office of Safety. They are so heartened by the results that they have proposed——

Mr. GLICKMAN. How many are you going to do this year?

Mr. BLANCHETTE. I will get that answer for you as to the specific number.

Mr. GLICKMAN. OK.

[The information follows:]

Mr. BLANCHETTE. We will perform two system assessments and we plan to do 49 task force assessments. A task force assessment is an inquiry similar in scope to a system assessment on a portion (usually region-sized) of a railroad.

Mr. GLICKMAN. Let me ask, have you been involved in the Las Vegas-Los Angeles corridor feasibility study?

Mr. BLANCHETTE. Only to the extent of funding 50 percent of it. We are letting the local authorities sketch the contours of that study. But we did find a pocket of cash which permitted us to fund 50 percent of that study. We are doing a similar study working with the State of Michigan, Chicago to Detroit, and we are—we either have concluded or expect to conclude a similar study with New York State.

Mr. GLICKMAN. What statutory program is this money coming from?

Mr. BLANCHETTE. I will get those statutory references. I have been enjoined not to practice law since I have been administrator.

Mr. GLICKMAN. I assume it is lawful?

Mr. **Blanchette**. It is lawful, yes; if it isn't lawful, there will be another RIF at FRA shortly.

[The information follows:]

The funds for this study were authorized under section 1008 of the Rail Passenger Service Act. Section 1008 is part of Title X—Rail Passenger Corridors of the Rail Passenger Service Act which was added by section 212 of the Passenger Railroad Rebuilding Act of 1980 (P.L. 96-254).

Mr. **Glickman**. In terms of this study, you say the local units, the States have pretty much designed what they want to be studied? Are you going to participate in this any further?

Mr. **Blanchette**. I think we have expended our funding and I think they awarded the contract last Thursday or Friday. Obviously our offices are available for any technical help which is needed. We will perform the normal audit control and that sort of thing, but really I think the local leadership is called for in those situations. I think the people in Nevada know far more what their needs are than the bureaucrats in Washington.

Mr. **Glickman**. We thank you very much for your testimony.

Mr. **Blanchette**. Thank you, Mr. Chairman.

[The prepared statement of Mr. Blanchette follows:]

TESTIMONY OF ROBERT W. BLANCHETTE
FEDERAL RAILROAD ADMINISTRATOR
BEFORE THE
SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS
COMMITTEE ON SCIENCE AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES
April 5, 1982

Mr. Chairman and Members of the Subcommittee, you have invited me to discuss the Federal Railroad Administration's current research and development activities in high-speed rail technology, rail safety, and productivity improvements, the results of the assessment of advanced rail technology conducted for us by the Massachusetts Institute of Technology, and future U.S. demand for rail transportation.

I want to focus first on rail freight transportation. Our freight system is the finest in the world. In 1981, U.S. railroads handled more than one and a half billion tons of traffic. Of that total, coal accounted for 528 million tons, including 110 million tons of exports. As domestic and foreign utilities turn increasingly to coal, present estimates are that rail coal traffic will grow by more than 50 percent, or nearly 300 million tons per year, by 1990. The railroads will continue to be the backbone of our freight transportation system, handling the majority of long-haul, large volume movements of bulk commodities. The railroads will play a vital role in meeting the demands of our own industries and in carrying coal and grain for export.

The main line rail system needed to accommodate the demands of the 1980's is in place and well maintained. American railroads spent five and one half billion dollars on maintenance of way and structures in 1981--a significant commitment to rehabilitating and maintaining track. Nearly 100,000 new or rebuilt hopper cars have been added to the railroad fleet in the last three years. As traffic grows through the decade, the railroads will have ample capacity to handle shippers' needs.

The Federal Railroad Administration has contributed to the effort to improve the railroads' ability to satisfy future freight demand. For example, the Government has invested several billion dollars in Conrail to permit rehabilitation of track and rolling stock. Conrail's plant is now among the best in the nation, and its operations will soon be attractive enough to be restored to the private sector.

Under another program, FRA has participated in organizing and financing an experimental program at the Houston terminal to install a computerized yard inventory control system and to establish automatic data exchange capabilities among the six trunk line carriers and the two terminal belt lines operating in the port. The system permits the carriers to move freight cars into and through the terminal area as smoothly as if they were being handled by a single railroad. Unit trains of grain can now be unloaded in a continuous process without time-consuming uncoupling and switching. The resulting reduced turnaround times improve utilization of freight cars and increase capacity to meet the demands of grain shippers. The innovations supported by FRA have alleviated congestion in the rail system in our major port for export of grain shipped by rail and our largest petrochemical center while forestalling the need to find land for expanding railroad facilities in the densely developed port area.

FRA has also assisted in developing a new freight car scheduling system involving computer processing of information on the availability and movement of freight cars. This system permits up-to-the-minute tracking of every car, loaded or empty, as well as monitoring the location of loads to be picked up and congestion or other conditions that might affect deliveries. The car scheduling system allows railroad managers to see how each car can be moved most efficiently, to reduce unnecessary train-miles, to cut the time required to move cars through terminals, and to improve reliability and speed of service. With FRA assistance, the system has been successfully demonstrated on the Missouri Pacific Railroad, which has been so pleased with the results that it has implemented the system throughout its 12-state, 12,000 mile network.

FRA's research and development activities, although focused on our primary mission of rail safety, also make contributions to the productivity of the railroad industry. For example, FRA has agreed with railroad labor and management to complete a locomotive simulator that will provide the most realistic reproduction ever achieved of conditions in the locomotive cab. This locomotive evaluator will replicate the dynamic forces and the operating environment of a full-scale locomotive cab. The engineer will see, feel, and hear the same things he would in a locomotive in actual service. The evaluator will record his responses for later analysis. The facility will be used to simulate or recreate accidents so that specific countermeasures can be developed. New devices or operating techniques can be installed and tested to determine their effectiveness in the laboratory before installing them on operating locomotives. The evaluator will also yield trainhandling information applicable to increase fuel efficiency as well as safety.

FRA is developing this facility in response to a national problem that is too complex for its costly solution to be borne solely by any locomotive manufacturer, or railroad, or industry association. I believe this is an appropriate role for a Federal research organization. In other respects, FRA will leave commercial areas of research to the private sector, and our proposed 1983 budget reflects that theme.

When complete, the evaluator will be operated by a private research organization, the Illinois Institute of Technology Research Institute. The facility will be available for FRA to purchase time to conduct accident investigations or experiments. To minimize the cost of our use of the evaluator in future years, the Institute will sell time to private users who want to develop proprietary data or to strengthen their engineer training programs.

A similar relationship between safety and productivity characterizes other major research programs. Our research has been redirected toward FRA's principal mission of assuring safety in railroad operations. All our research projects are directed toward reducing the likelihood of catastrophic railroad accidents, improving track structure and detecting track defects, and reducing employee and public injuries and fatalities. Where these activities yield results that increase the productivity of the industry, we make the information available to the railroads and their employees.

Our research and development efforts in rail passenger transportation have changed sharply during the last decade. Ten years ago the program included very high expenditures for the development of exotic technologies: vehicles utilizing tracked air cushions, linear induction motors, and magnetic levitation. Approximately $56 million were spent on such advanced systems between 1966 and 1981, most of it between 1966 and 1975. To my knowledge, no one in either the public or private sectors was willing to commit funds to the further development of these technologies. This reflects a more realistic view of the limited market for high-speed ground transportation technology in the United States, the existence of work abroad, and the need to focus on workable technology that can be used now.

Accordingly, we are concentrating on assuring that the Northeast Corridor is capable of performing effectively. The Northeast Corridor is the only line in Amtrak's basic system that is to operate at speeds in excess of 110 miles per hour. The Northeast Corridor is especially difficult to manage because, unlike the new Japanese and French lines that carry only passenger trains, it has a uniquely busy and complicated mix of intercity passenger, commuter, and freight traffic. We have reoriented the Northeast Corridor Improvement Project to optimize the utility of this vital rail system for freight and commuter traffic as well as intercity passenger trains. Our success is shown by Amtrak's express Metroliner service between Washington, D.C., and New York which now makes the trip in 2 hours and 59 minutes with a remarkable record of on-time performance even though the whole Northeast Corridor project is not yet completed.

Congress has also given the Secretary a special responsibility to see that Amtrak's equipment is capable of fully utilizing the potential of the Northeast Corridor right-of-way in which the Government is investing so much. One way that we are carrying out that responsibility is testing a mechanism that can be fitted to Amtrak's coaches now serving in the Northeast Corridor to permit them to tilt inward while rounding curves. This enables curves to be negotiated at higher speeds while maintaining passenger comfort and safety--a matter of considerable importance between New York and Boston and in other locations having many curves. To assure that a locomotive is available to pull tilt-body coaches at the speeds of which they are capable, we are testing the performance of Amtrak's F-40 locomotive, now in use between New Haven and Boston. This work may reduce travel time between New York and Boston at a modest cost far below that required to electrify the portion of the Northeast Corridor from New Haven to Boston.

We have also tested Amtrak's new AEM-7 locomotive and Amfleet coaches to determine the endurance of various components and to iron out some of the problems associated with maintaining brakes and other components. We have invested about $2.5 million in these efforts.

We understand that others will testify in greater detail on existing private sector efforts to develop high-speed rail corridors. Amtrak is working with Japanese interests on the feasibility of such operations and we look forward to reviewing the results of their inquiry. Amtrak has agreed that Federal funds should not be used to shore up a service that is not commercially viable. We have also made some matching funds available to a limited number of States and local governments to investigate the feasibility of private sector development of high-speed corridors or to plan cost-effective improvements in certain highly traveled corridors.

Of course, the Subcommittee is aware that the French have begun running regular service at 160 miles per hour and that the Japanese are operating excellent high-speed service. We have been following these and other developments in order to assess their applicability in the United States. One means we have of doing so is the study, about which you inquired, being conducted for FRA by the Massachusetts Institute of Technology. That study, covering both rail technology and other guideway systems, is to gather information useful in assessing options for future intercity ground transportation systems. The report is due this month, and we shall be happy to provide copies of the final document to you after all reviews are complete. I must caution, however, that, in view of FRA's emphasis on incremental improvements to conventional rail systems and our policy on Federal funding of new intercity projects, we regard the forthcoming report as no more than a resource document for long term transportation planning.

In conclusion, I want to reemphasize that the primary goal of the Federal Railroad Administration is to ensure that Federal policies contribute to safe and efficient rail transportation. I have described some of our safety-related research and development efforts and the contribution that spin-offs from such activities make to the productivity of the finest freight railroad system in the world. I am committed to assuring that a strong, safe, efficient, and privately-owned freight rail system continues to move the goods needed by domestic and foreign customers smoothly and economically to their destinations.

Mr. Chairman, this completes my prepared statement. I will be happy to answer any questions the Subcommittee may have.

Mr. GLICKMAN. Our next witness is Mr. J. R. Snyder, national legislative director, United Transportation Union.

It is a pleasure to welcome you here today.

STATEMENT OF J. R. SNYDER, NATIONAL LEGISLATIVE DIRECTOR, UNITED TRANSPORTATION UNION, ACCOMPANIED BY WILLIAM G. MAHONEY, COUNSEL TO THE RAILWAY LABOR EXECUTIVES' ASSOCIATION

Mr. SNYDER. Thank you, Mr. Chairman and members of the staff.

On behalf of the Railway Labor Executives' Association, its members and the employees of the Nation's railroads whom they represent, I wish to express our appreciation for the opportunity to present to you their views on a subject which we are convinced is most vital to this Nation's future welfare, not only in terms of our future transportation needs, but also in terms of energy conservation, and the creation of jobs.

My name is J. R. Snyder. I am chairman of the Legislative Committee of the Railway Labor Executives' Association and the national legislative director of the United Transportation Union. My office is located in the Railway Labor Building, 400 1st Street, NW, Washington, D.C. Accompanying me is Mr. William G. Mahoney, counsel to the Railway Labor Executives' Association.

The Railway Labor Executives' Association is an unincorporated association with which are affiliated the chief executive officers of all of the standard national and international railway labor unions in the United States. The organizations whose chief executive officers are members of the RLEA are listed below:

American Railway and Airway Supervisors Association, division of BRAC;
American Train Dispatchers Association;
Brotherhood of Locomotive Engineers;
Brotherhood of Maintenance of Way Employees;
Brotherhood of Railroad Signalmen;
Brotherhood Railway Carmen of the United States and Canada;
Brotherhood of Railway, Airline & Steamship Clerks;
Hotel and Restaurant Employees & Bartenders International Union;
International Association of Machinists and Aerospace Workers;
International Brotherhood of Boilermakers and Blacksmiths;
International Brotherhood of Electrical Workers;
International Brotherhood of Firemen & Oilers;
International Longshoremen's Association;
International Organization of Masters, Mates and Pilots of America;
National Marine Engineers' Beneficial Association;
Railroad Yardmasters of America;
Sheet Metal Workers Union of America; and
United Transportation Union.

Mr. SNYDER. We appear here today to voice our unanimous and enthusiastic support for the establishment of a high-speed rail transportation system in the United States. Mr. Chairman, I also find it gratifying to see the continuing congressional interest in advanced rail technology and in strengthening our Nation's rail transportation.

Only last July I testified before the Joint Economic Committee in support of H.R. 4028, a bill that was designed to revitalize America's rail system through the development of high-speed rail passenger service in this country's heavily populated transportation corridors. That legislation sought to implement the April 1981 report on rail passenger corridors conducted by Amtrak and the DOT. In my judgment, that report supports the conclusion that Amtrak is better prepared for the development of high-speed rail passenger service for our heavy population corridors than ever before.

Since the congressional enactment of the Rail Passenger Service Act of 1970, Amtrak has literally resurrected a system that was initially conspicuous by its dilapidated equipment and, for the most part, inadequate rights-of-way. Amtrak's success is evident in the number of people choosing rail transportation over other modes. By the end of 1981, more people than ever, nearly 21 million, rode Amtrak passenger trains. Thus, at a time when air and auto travel were declining, ridership on trains was up 3.4 percent.

Amtrak's progress, moreover, is not only manifest in the increaesd number of rail passengers; its service quality is also rising sharply. Amtrak's ontime performance is now 77 percent systemwide. Amtrak also reports that its consumer complaints have dropped more than 40 percent. With the advent of new equipment, passenger complaints have dropped by over 80 percent on some routes.

Despite this evidence that Amtrak is succeeding, we are all aware that our national passenger railroad system has reached a critical juncture. The United States is one of the few countries in the world, indeed it is the only major industrial Nation where there is still serious debate over the future of rail passenger service.

Decisions made during the next few years will determine what role our rail passenger system will have in American life in the decades ahead. The past few years have taught us the costly lesson of our dependence on imported oil. Burgeoning fuel costs indicate that the day is approaching, if not already here, that we can no longer depend on the automobile and airplane for our transportation needs. Amtrak has shown that, if given good service and equipment, the public will use passenger trains in large numbers.

Today the public interest demands an adequate rail passenger system. It is therefore particularly discouraging to observe this administration's antirail bias. At a time when the need to develop more fuel-efficient transportation in a number of intercity corridors is greater than before, this administration has announced its intent to shift the focus of the Northeast corridor improvment project [NECIP] away from development of high-speed rail service to simply maintaining safe and reliable service only. To cut Amtrak from its relatively modest needs of $788 to $600 million, moreover, precludes Amtrak from even considering implementation of a high-speed rail corridor type program.

Only last week, in response to this woeful economic climate for rail-oriented industries, Amtrak announced the formation of the American High-Speed Rail Corp. According to the announcement, the corporation will seek private capital to establish the Nation's first high-speed passenger bullet train, similar to that of the Japanese Shinkansen, between Los Angeles and San Diego. Future routes also being considered for similar use of such high-speed train technology are Tampa-Orlando-Miami, Dallas-Houston-San Antonio, and a route in the Chicago area.

Although it is regrettable that our Government is unwilling to make the commitment to implement a high-speed rail system, the Railway Labor Executives' Association lauds the intention of the newly formed corporation. For whether it be through Government funding or private capital, it is my judgment that the development of high-speed rail passenger service for our heavy population corridors can serve as the focal point for this country's reindustrialization.

The April 1981 Report on Rail Passenger Corriders, by the DOT and Amtrak, supports this conclusion. One of the report's most striking findings is the number of jobs that would be generated by developing a number of rail corridors. Thousands of people would find new job opportunities in all sections of our country.

The Boston-New Haven corridor, for example, would require 3,719 new jobs. In the South, the Atlanta-Nashville corridor would require almost 2,500 additional employees. Over 4,400 new jobs would be created in the Midwest on the Chicago-Cincinnati corridor. In the Southwest, over 12,000 additional employees would be required for the Texas Triangle corridors. And 3,300 new jobs would be created on the Seattle-Portland corridor in the West.

In all, over 60,000 new jobs would be necessary to develop the 20 rail corridors discussed in the report. Thousands of other jobs would also be required for operation of the corridor service itself. There would be increased employment of engine and traincrews, onboard service personnel, and maintenance personnel.

This, however, represents only a part of the effect that the development of high-speed train technology can have upon the revitalization of the railroad industry. To successfully implement a high-speed rail passenger system in the United States, we must make the commitment to a first-class railroad passenger manufacturing industry.

Amtrak's fleet today contains only about 1,700 passenger cars. A nationwide rail passenger system, even one encompassing only the heavily-populated interurban rail corridors, cannot be served by 1,700 passenger cars. In 1978, Japan had 2,352 high-speed cars on its Shinkhansen bullet train system alone. Nationwide, Japan has 26,000 cars for a route structure only half the size of ours. The Soviet Union builds 2,000 new passenger cars every year. France, Great Britain, and West Germany all have over 17,000 rail passenger cars. And Italy has over 10,000 cars.

All of these industrialized nations have good highways, an abundance of automobiles, and modern air carrier operations. All of these countries, however, are building new high-speed passenger systems and are operating many times more passenger cars than does Amtrak. Against this distressing picture of the Nation's rail supply industry, the Pullman Transportation Corp., one of this Nation's oldest and largest manufacturers of rail passenger cars, recently announced that it was discontinuing its manufacture of such cars.

It is time for our country to stop lagging behind in the development of a truly balanced transportation system. This is especially true at a time when this country needs jobs as a basic part of a revitalized economy. And it needs jobs in support of a major industry. The rebuilding of a rail passenger car manufacturing industry could produce one of the greatest employment expansions since World War II.

A commitment to revitalizing our country's passenger railroad system makes good sense. Developing a high-speed rail corridor service will also foster business and employment opportunities in the areas served. This is evidenced by the corridor meetings held by Amtrak around the country along the routes speciifed in the April 1981 report.

Public officials and other members of the respective communities spoke enthusiastically about the economic benefits that development of these rail corridors could have. Many expressed the conviction that renewed rail passenger service would encourage the growth of business and reinvestment in downtown areas, and would greatly increase tourism, in addition to meeting daily business commuter needs.

Nor should we fail to meet the challenge of revitalizing rail passenger service because of its cost. In today's atmosphere of budget cutting, some might ask how an expansion of our rail passenger system can be justified at this time. The answer can be found in its long-term economic benefits and the alternatives.

Escalating fuel prices make the long-term future of car travel a matter of grave concern. Air carriers are finding that, in the age of deregulation, many of their shorter routes are uneconomical and they are therefore cutting service. It is imperative that rail service be expanded to meet the new demands.

The costs of a national commitment to a balanced transportation system must be put in perspective. In its 1977 annual report, Amtrak stated that, since the end of World War II, Federal subsidies for highways were $102.8 billion; for airways, $30.6 billion; for domestic waterways, $13.3 billion, and for ocean shipping, $7.4 billion. The total for the railroad industry, both passenger and freight, was only $5.9 billion. Viewed in this context, it is our lack of financial commitment to the rail industry that is unreasonable.

Maintaining inadequate rail passenger service will eventually cost this country a great deal more than money. At best, it will result in an accelerated depletion of fossil fuels. At worst, it will result in many citizens being unable to travel for pleasure or need.

As stated, the other industrialized nations around the world have invested heavily in their rail passenger futures. At a time when many are asking what happened to the industrial genius that served to make this Nation great, it is time to commit ourselves to providing rail passenger service that is the best in the world.

More than 150 years ago, railroads began to build this Nation. Now railroads can be the catalyst in this country's revitalization and reindustrialization. We therefore urge that Congress commit this Nation to the development of a high-speed rail passenger system equal to or better than those of the other industrialized nations.

Thank you for the opportunity to present our views on this subject.

Mr. GLICKMAN. Mr. Snyder, we thank you for your testimony.

I would note that I agree with your conclusion; it was to a large extent the development of American railroads which provided a transportation network which made us grow and be strong all over this country. There is no question, passenger service is effectively dead now, even with the statistics you cite on Amtrak. Percentagewise, nobody travels by trains. A lot of people are being inconvenienced because of that, because it is to a lot of people the only relatively inexpensive way to travel. I agree with your conclusions.

I would like to ask you, if we should go ahead with such a high-speed transportation system, whether we do it on a piecemeal basis, by starting with a few corridors, like Orlando-Tampa, or Los Angeles-San Diego, or build a national network, what do you think the Federal Government should do financially?

Mr. SNYDER. Mr. Chairman, with our expertise in the railroad industry, we know it would take a couple of years to reach the recommendations we have outlined before your committee here.

As I pointed out, we should start, and start right away. I disagree with Mr. Blanchette and others that the Federal Government should not be a part of this. I agree that the Federal Government should participate in this, whether we do it with some special funds like the Highway Trust Fund or some allocated fund, that would do it. I think it should be done on some of the better corridors from different sections of the country on a trial basis, because I think you are going to find that results are going to be outstanding in this.

We have found that where the service and equipment has been improved, even on Amtrak, the response has been great, particularly where the airlines are cutting service. Under the airline deregulation, these short flights, the airlines do not want them. There are so many people out there that would prefer to take a train and ride between these key points. And I think the Federal Government should participate in their development.

We would be glad to work with the Members of Congress on that. I realize the budgetary problem now, but I also realize that the transportation needs of this country are going to grow, they are going to continue to grow in transportation. We are way behind. We should have started several years ago on this.

I want to compliment the committee on this. We wholeheartedly think we were one of the champions of Amtrak, because rail labor spent a considerable amount of time and effort in keeping some form of it, because it is the belief and policy of rail labor that we should have a good sound passenger train system in this country.

Mr. GLICKMAN. Let me ask you about the FRA budget. I was trying to press Mr. Blanchette on his budget, which has been cut. Do you believe that the cuts that the administration has proposed in the FRA budget, including the research part of the budget, will have an adverse impact on operation of railroads, rail safety, your membership, whatever?

Mr. SNYDER. That is a good question, Mr. Chairman.

At present I serve as chairman—in addition to being legislative chairman for the Railway Labor Executives' Association, I wear another hat, and that is chairman of the safety committee.

It has been my responsibility to do all the testifying before the Appropriations Committee—with my staff, of which we have a very capable committee set up to work with this—it has been our position all along that a good strong research program is needed in the railroad industry just like any other industry.

However, I must state at this point there has been a lot of disappointment in the present system, and the dollars going into the present system. In other words, what I am saying is, we have seen very, very little results from the research that we have had in the past.

Mr. GLICKMAN. Have you had any input into those research dollars?

Mr. SNYDER. Yes, on a couple of occasions I tried to switch some of that research, get a few more inspectors out there, out on the road inspecting some of the unsafe conditions.

Mr. GLICKMAN. That would be producing some results?

Mr. SNYDER. Yes, we would get better results.

Mr. GLICKMAN. OK, you led me into this area. I was not going to ask you this. It is not directly related. Would you give me your thoughts on the FRA's rail safety program and their new safety system plan? Do you have any thoughts on any of that?

Mr. SNYDER. We have problems with the rail system safety plan. We have discussed this with Mr. Blanchette and his staff. I will give you a good example, hours of service, which is one of the oldest statutes on the books.

When a crew is called to duty, the dispatcher, and all officals they are working under, know all about the hours-of-service law, it is a Federal statute. We just updated it several years ago from 16 to 12 hours.

The way we interpret the system plan is to give the railroads an opportunity to get their act together. For example, if there is a violation out there, "We are going to forgive you this time but next time you are going to have to pay the price or you are going to be fined." We really do not think it will work. Who is going to keep records in the first place?

Most of our local people out in the field, when they are handling unsafe complaints, they handle this with the carrier to start off with, on a local basis. They give them an opportunity to correct it. By the time it reaches me they have had their opportunity because this is the policy of the UTU, and rail labor as a whole, to give the carriers an opportunity to correct those unsafe conditions. If they don't, don't send it to me unless you give them that opportunity.

What we are saying here is, they are getting double opportunity, one at the bottom and one on top.

I would say the jury still is out on that. We are watching it carefully. We hope we can resolve this. We and Mr. Blanchette have sat down with the committee from rail labor, a committee from the carriers, to reach agreement in the area that we outlined, three or four key issues in safety, to update them with the understanding that there will be no deterioration of safety. In most of the areas it would be an improvement in safety.

The power brake law, which has been on the books since 1959, in which we have made some changes, extended the inspection from 500 to 1,000 miles, provided each train, when it left its terminal, would receive a through inspection. Now the reason for this is, since the last 20 years the equipment has changed. Roller-bearing equipment, you have better equipment out there, you have a better braking system, with a larger engine also. The carrier proved that, for one purpose: To expedite that train so he could compete with other forms of transportation. So he would not have to be delayed in this terminal here 4, 5, or 6 hours because they have to make a brake test.

So this was our approach to the thing. This is now in its final stages, along with updating the track standards, along with the handling of the disabled cars, which will come before Mr. Florio's committee this month. We will be testifying on that.

We are hoping these things have been resolved. We have been assured by Mr. Blanchette on the system safety plan, that he is going to carry out this agreement verbatim. We have had assurance, until it has been finalized and until it is beginning to work, it would not be a deterioration of safety; it would be just updating some of these rules.

Mr. GLICKMAN. Let me ask you one final question.

Some people have suggested that if we were going to have a high-speed rail transportation system in this country, that rail labor might have to modify some of its rules, such as the 100-mile-day rule. I wonder if you would have any comment on that?

Mr. SNYDER. Mr. Chairman, that is one of the oldest things around here. You know, a lot of people do not understand that the truckers are out here paid by the mile, the railroad handles their freight by the mile. This is a rule that has been in existence for a number of years, been through collective bargaining, several contract negotiations, and neither side has come up with anything better. They have tried it and not come up with any better way.

The railroads use it; to a great extent there is a lot of propaganda in it, because in some cases you do have a few runs out there that might make 100 miles in less hours than it would on 90 percent of the other runs out there. But really, I think the public relations is that the railroads are trying to lead us to believe that if we could just get rid of these type of work rules—actually what they have in the back of their mind is to cut the salary. This is a collective bargaining issue.

My organization is now at the bargaining table with the carriers. So these issues have been resolved. One of the most historic, finest Federal statutes on the books, is the Railway Labor Act. Railway labor is not as backward as you might think.

On the high speed—I am getting around to your specific question here on the high-speed transportation—certainly we would look at how the high-speed operation of the train would make a difference in operation with the regular passenger trains and all. Certainly labor and its appropriate committee under the Railway Labor Act, through the appropriate collective bargaining unit, will sit down and resolve these issues and resolve them very satisfactorily.

Mr. GLICKMAN. Thank you. I want to thank you for testifying.

As you probably know, I have many of your members in my district, on the main and branch lines of the Santa Fe Railroad. I have always appreciated the input I have received from your people and look forward to working with you as we try to develop this issue further.

Mr. SNYDER. Mr. Chairman, in closing, I would like to, on behalf of railroad labor and the rank and file, the old boy working out there on the railroad, thank you personally, you and your staff, for having been very active and reasonable in the safety approaches to the railroad industry.

We want to thank you very much. We stand ready to work with you in that direction any time, any place.

Mr. GLICKMAN. Thank you very much. We appreciate your testimony today.

Mr. GLICKMAN. Our next witness is Mr. Milton Pikarsky, transportation research director of the IIT Research Institute, accompanied by Mr. Robert Krause.

Mr. Krause is a former State legislator from Iowa and former chairman of the Iowa House Committee on Transportation.

We are glad to have you here today. We are appreciative of your testimony. Your entire statement will appear in the record. So if you wish to summarize in any way, you may do so.

STATEMENT OF MILTON PIKARSKY, DIRECTOR OF TRANSPORTATION RESEARCH, IIT RESEARCH INSTITUTE, ACCOMPANIED BY ROBERT KRAUSE, FORMER STATE LEGISLATOR FROM IOWA, AND FORMER CHAIRMAN, IOWA HOUSE COMMITTEE ON TRANSPORTATION

Mr. PIKARSKY. Thank you, Mr. Chairman.

It is a privilege to testify before you today on several of the problems, and the progress associated with the advanced railroad technology field, and we will summarize our statement.

My name is Milton Pikarsky, director of transportation research at the Illinois Institute of Technology Research Institute. I am appearing today with Mr. Bob Krause, who is a former State legislator from Iowa, and former chairman of the Iowa House Committee on Transportation.

We are here today to discuss the need for a well-organized long-term research program within the railroad freight industry and to outline certain areas that deserve special consideration.

An economically viable railroad freight industry will offer many benefits to the public at large, including the provision of low-cost services for moving many commodities and for minimizing the use of limited petroleum resources. It is the function of research to create an environment that encourages the introduction of new technologies which will have real economic benefits. The limitations on research spending we see today are barriers themselves to technological utilization and thus will have a substantial effect on the long-term economic viability of the railroad industry.

Acceptance of technology by the railroad industry is severely limited by the economic condition of the industry and by the relatively long life of its current assets. In addition, interesting new technology cannot be given consideration because of the great demands for capital for new yards, for improved track structures, for locomotives and equipment, and for signaling systems and computers, all of which are essential for continued operation.

The industry is always in a position of having to face great competition for capital, and new and relatively untried very expensive techniques are generally unattractive. The industry has shown a great willingness to adopt technology when significant improvements can be identified and the cost is modest.

I feel strongly that in today's difficult economic situation not only is it the appropriate role of Government to encourage additional research, it is critical to the long-term economic well-being of our country. In particular, I feel that the following areas deserve greater attention:

One, energy conservation;
Two, safety standards;
Three, hazardous materials movement;
Four, innovative technologies for the movement of bulk commodities.

Mr. Krause will address this last point in greater detail.

The need for energy conservation is one of the principal concerns for the industry at the present time. The cost of fuel has increased to the point where it is almost as high as direct labor costs. Therefore, one of the major areas of future research would be for the development of more efficient locomotives and locomotive operating procedures. In the days of low fuel costs, the railroads could be tolerant of operating practices which resulted in a low efficiency for the conversion of fuel energy into useful work. This can no longer be tolerated.

There is the need for the development of new and improved training methods so that operators can learn more efficient ways to use existing equipment. Many of the practices which have been followed in the past to control a train—for example, power braking—result in wasted fuel energy. Many railroads are pursuing an aggressive program in the use of evaluators or simulators for training their personnel to follow operational techniques which result in lower fuel usage. The railroad and locomotive evaluator/simulator [RALES] facility, which is now under construction and will be installed at IIT Research Institute [IITRI] in Chicago, Ill., will be an advanced facility of this type.

The RALES facility will provide complete simulation for the operation of a railroad locomotive. It is being configured to duplicate all features and controls of an SD-40 locomotive, and will have the capability for representation of other cab arrangements.

The facility will provide high quality visual simulation of the view from the engine operating position. It will also contain computer simulation of all engine functions so that the visual display will accurately reproduce the motion of the train which results from the operation of the locomotive controls. The facility will also have the capability to record an accurate description of all significant train operating parameters, such as air brake functions, coupler force, slack run in or run out, fuel consumption, et cetera.

The facility will provide vibratory motions to the cab to reproduce those which would be experienced when operating at different speeds. Motions which simulate the effects of slack run in and run out will also be included.

The RALES facility was originally designed as a research tool for providing data on the performance of engine crews during simulated train operation, but it will also be available for conducting training programs for railroad personnel. It is the first of FRA's efforts to transfer a technological tool from Government to the private sector, and IIT research has been given the responsibility for maintaining and operating this facility and is required to maintain and operate it for a 10-year period after installation is completed. And the use of this facility is a question of concern for us.

In addition, the railroads need to continue research on alternate energy sources. In recent years much attention has been given to the possible use of electrification so that coal or nuclear energy can be substituted for petroleum. The result of these studies has shown generally that this is not an economically satisfactory answer because of the large investment that is needed for electrification.

Research should be continued on alternate methods of energy conversion and utilization which would take advantage of the unique characteristics of a railroad. For example, maximum weight is not a critical parameter and power sources much larger than those used on highway vehicles can be employed.

A second major area of research which should be given high priority is the study of ways for making more effective use of industry design standards and both industry and Government safety regulations. Better understanding is needed in this area so that railroad facilities and equipment can be used more efficiently.

For example, the rate of track deterioration is of major importance to railroad operations. The effect of the use of heavy equipment and large capacity cars on the rate of wear, the development of rail cracks, roadbed settlement, et cetera, is not precisely known. The use of lighter equipment may be more cost effective when all factors are considered, but because the basic parameters affecting track damage have not been adequately determined, the optimum set of conditions is not known.

As another example, one can consider the track standards which supposedly will provide for safe operations. For example, allowable operating speeds are given as the function of permissible variations in track geometry. It is possible that much unnecessary work is being done to maintain a certain level of track conditions which have no economic or safety benefit. Also, it may be more profitable to work toward the development of equipment which has a broader toleration of track variations so that operations could be permitted over more irregular track.

Much important work is being conducted on these particular areas at the present time. The tests being conducted at the Facility for Accelerated Service Testing [FAST] at the Transportation Test Center [TTC] is a good example of this. The rates of wear and track degradation are being studied as a function of various operating parameters.

As part of this work, a number of tests are being conducted to determine the actual force magnitudes which exist at the wheel-rail interface. This has required the development of new wheel-rail load measurement techniques which are providing an adequate description of this environment that has been very difficult to measure in the past. The forces are highly transient in nature and are affected by many parameters such as the particular design of the car suspension and truck system and the condition of the rail and roadbed. Methods for improved measurement and the analysis of data from this type of test work should be further encouraged.

Many of the design standards which are used to specify the strength of railroad components had been developed on the basis of experience, and the margin of safety which is present in these requirements is not fully understood. A greater understanding of the many factors which affect the reliability and structural integrity of these components is important.

An excellent example of this is the railroad wheel. The failure rate of wheels in service is very low, but when they fail suddenly by fracture, there is the possibility that a very serious accident may result. Many in the railroad industry believe that wheel failures are one of the most serious railroad safety problems; 15 million wheels are in service; 400 accidents happen per year; and 200,000 wheels are taken out of service because of visual concerns as to whether they will fail or not. Wheel failures have catastrophic potential such as experienced in Laurel, Mississippi, and Waverly, Tenn., where wheel failures caused the derailment of hazardous material tank cars, which led to fatalities, injuries and property damage.

There are still many uncertainties in the type of safety criteria which should be used for wheels. For example, there is considerable disagreement as to tolerable crack sizes and characterization of other wheel defects. Brake applications can adversely affect the susceptibility of wheels to failure by creating too much heat in the wheel resulting in an overstressed condition.

Much work is required to fully understand the significance of this problem and ways of combating it. Present rules require the removal from service of wheels which give evidence of having been overheated by the indication of a discoloration around the rim of the wheel. There is a need for extensive test work to be performed to determine precisely how the overheat condition is related to wheel failure. The development and use of special test facilities to conduct this type of research is recommended. Results of this work would lead to an understanding of what the proper margin is for the operation of this equipment.

Another reason for the improvement of design standards and specifications is the increasing shipment and sale of many foreign products to the railroad industry in the United States. Over the years relationships have developed between the railroads and the U.S. States supply industry which has generally resulted in a high quality level of products. Recently there has been increased pressure to accept imports from foreign manufacturers for use by U.S. railroads. In some cases the design standards which have been in effect for U.S. equipment do not adequately treat all the factors that are of importance for the use of the equipment because they are based on a mutual understanding of conditions which are maintained between the supplier and user.

With the introduction of a more diverse range of equipment, there is a constant need to upgrade and review the standards which have been used in the past and to determine their suitability for present market conditions. Where problems are evident, additional work must be devoted to the improvement of these specifications through research programs which assess all pertinent factors.

A third area of importance for research in railroad technology is a continuation of studies to reduce the risks to the public of moving hazardous materials by rail. Rail is the ideal mode for bulk load shipments of chemicals. There have been numerous accidents in the past involving the release of toxic or flammable materials which have resulted from train derailments. These have caused fatalities, injuries, property damage, and wholesale evacuation of communities.

Much work has been done to improve the safety of the transportation of these hazardous materials by rail such as the regulations covering equipment designs for carrying liquified flammable gases under the rulemaking procedures of the MTB. These regulations, however, have pertained only to tank cars carrying certain types of hazardous materials and there are other tank car classifications which are authorized to carry other hazardous materials. Work must be continued to determine how additional regulations can be written which will protect public interest and yet not result in an economic penalty for the industry.

Another problem is related to the shipment of nuclear waste materials which are expected to increase significantly in the future as nuclear powerplants reach waste storage capacity limits. Previous work on containers for the shipment of these materials has indicated that they can be made strong enough to resist puncture, but that they may be susceptible to damage and release of harmful radiation if involved in fires. Work should be continued to determine optimum strategies for the transportation of this class of material.

The shipment by rail of cryogenic materials is also expected to increase. Many of these materials are both toxic and flammable and there are no current requirements that rail cryogenic cars have fire protection.

It has been found that many accidents involving the rail shipment of hazardous materials have occurred not due to the accident itself, but due to improper wreck clearance and emergency response procedures after the accident.

For example, at Waverly, Tenn., a tank car explosion occurred 2 days after the accident. There are many differences in opinion concerning the proper response to specific accident scenarios. More work is required to determine a general set of guidelines which will encompass all possible emergency situations.

Another problem with the rail transportation of hazardous materials is that attempts are being made by many States and localities to prohibit or restrict the shipment of hazardous materials through highly populated areas. However, it often is found that circuitous routing may increase the risk because of additional switching operations or the movement on track which has a higher accident probability. Work must be directed at the development of procedures and equipment for minimizing risks to the public.

It should be recognized that there is always some chance, although a very remote chance, of a failure wherein a severe threat to public safety would result. These risks must be better understood and procedures must be developed for dealing with the remote possibility of very serious events.

A final area that is becoming increasingly critical is in the development of new technologies to improve the efficiency of movir bulk grain from farm to market. Massive branch line abandonment may have been necessary for industry, but they are having a disastrous effect on the American farmer.

One concept that has received some attention over the years is the one area of intermodal transportation.

Mr. Krause will speak in greater detail about the potential benefits to be gained by a greater use of innovative intermodal technologies, but let me conclude with a brief history of the concept.

The concept of intermodal transportation was first tested in 1926 on the Chicago, North Shore, and Milwaukee Railroad lines in service between Chicago and Milwaukee. Growth of this piggyback concept was rather slow until the service was marketed in the late 1950's as an innovative means of combining the low cost of rail-line haul with the flexibility and speed of highway transport pickup and delivery. By the 1960's, piggyback shipments were growing at the rate of 10 percent per year; however, the rapid expansion of the Interstate Highway System and deteriorating services provided by the railroads have slowed the growth of piggyback loadings.

In 1977, the revenues for trailer-on-flatcar [TOFC] totaled 7 percent of all rail revenues, and TOFC car loadings accounted for 7 percent of the total. Average revenue per-ton figures for the same year were $14 for general rail freight, $30 for TOFC, and $35 for motor freight.

The railroad companies have concentrated their TOFC and container-on-flatcar [COFC] terminals at traditional rail centers. These terminals have become very large, utilizing expensive but highly efficient equipment for the loading and unloading operations. Corridors have been established between these large terminals to provide overnight services between cities up to 500 miles apart.

At the same time, railroad line mergers and rail line abandonment have left many communities without the benefit of rail service.

Equipment and systems designers are attempting to develop the intermodal systems of tomorrow. These systems must provide the national freight transportation service that will make the best possible use of scarce and expensive energy resources. At the present time there are no less than nine innovative intermodal concepts being tested on the Nation's railroads.

The most innovative and cost-effective systems utilize a highway trailer which can be converted to railway use without a flatcar, and can be readily transferred from the highway mode and vice versa at any siding without expensive transfer equipment.

Mr. Bob Krause has invented a system called Bestrack—an acronym standing for bimodal energy saving truck-rail articulated container. Bestrack will eliminate the need for a flatcar bed and elaborate load-unload facilities for piggyback.

In 1978, the Department of Transportation commissioned an extensive study of all existing proposals for improving the national intermodal system. The purpose of the study, "Systems Engineering for Intermodal Freight Systems Phase 1," by Peat, Marwich, Mitchell & Co. & Associates, was to identify and recommend for development that system which seemed most economically and technologically feasible. The study recommended Roadrailer as its choice for further development.

Since 1978, Roadrailer has been tested and currently Illinois Central Gulf [ICG] has leased 80 Roadrailers which are in operation between Memphis and Louisville. An article in the August 10, 1981 issue of Railway Age states that the Roadrailer system has accomplished a 19-percent cost savings over conventional piggyback service.

The Bestrack system promised to provide even greater savings since trailers can be compared with other systems currently being evaluated.

Mr. GLICKMAN. Mr. Harkin was very instrumental in asking you to come here today. He has been very involved in the issue of rail transportation, particularly in rural areas, as I am, because we come from similar States.

Mr. KRAUSE. Thank you, Mr. Chairman, members of the committee.

I, too, would like to summarize my prepared statement and ask that it be included as part of the record.

My name is Bob Krause. I am a farmer, former State representative from Iowa, former chairman of the Transportation Committee in the Iowa House, former transportation manager for Land of Lakes Agricultural Services which service 800 farm co-ops in seven States, a former regional representative for the Department of Transportation for Iowa, Kansas, Missouri, and Nebraska during the Carter administration, and former field coordinator for the Department of Transportation's efforts during the Rock Island & Milwaukee Railroad bankruptcies.

Currently, as well as farming, I am running for State Senate in a rural Iowa district. I am also the inventor of a grain transportation system called Bestrack and have been working with Mr. Pikarsky to develop it.

Mr. Pikarsky stated in his testimony that the system could have a positive impact on the economic consequences of branch line abandonment. Direct rail incentive itself is not sufficient to develop the Bestrack system. The broad sweep of national transportation policy, however, mandates that the technology side of the abandonment issue be addressed by someone.

In my testimony, I will go into the details of the problems I have had in promoting the system. Although I speak for myself specifically, I speak for small independent inventors generally in the scope of my problem.

Small independent inventors like myself who attack large conceptual problems face almost insurmountable barriers. Research and development laws and the tables of risk generally are not with us. R. & D. tax laws for prototype development are designed primarily for established ongoing concerns.

Limited partnership statutes do not give the same tax advantages with investors. Large conceptual inventions also have long lead times and high prototype costs. My prototype alone will have a lead time of 2 to 3 years and a cost of $1 million.

Venture capitalists do generally not approach a project like mine until that prototype is developed. Industry assistance, especially in the rail industry, as Mr. Pikarsky mentioned, is limited by the State of the industry itself.

Because of my background, I am especially sensitive to the problems which have historically prevented the introduction of new technology for the intermodal movement of agricultural commodities.

Generally, the existing problems that prevent agricultural intermodal movements are the high equipment weight of existing intermodal systems, the need for dispersed low density on and off load points, and the need for high strength equipment which can integrate into conventional rail hauls.

After reviewing the 1968 U.S. Department of Transportation study mentioned in Mr. Pikarsky's testimony, I recognized that none of the intermodal proposals discussed in the USDOT study targeted specificlaly on these agricultural needs.

Many of the proposals, including Roadrailer by North American Car Co., had problems with either rail mode or highway mode equipment weight.

Other proposals were refinements of existing piggyback systems. These proposals required expensive centralized crane or gantry facilities which are unsuitable for rail bulk movements.

Other proposals lack equipment strength and the ability to integrate into conventional freight movements.

Imagining that I could do better by concentrating on those needs, I began the work that resulted in the creation of Bestrack.

The savings generated for agriculture could be considerable. For example, for corn alone in an ideal world elimination of terminal transfer for corn could result in a net savings of $480 million annually nationally. We could gain an annual savings of $148 million in wheat by use of Bestrack.

Dr. Philip Baumel of Iowa State University, a nationally recognized grain transportation economist, and past Chairman of the USDA-USDOT National Rural Transportation Task Force, thinks that Bestrack has great merit, and has volunteered to do the economic analysis, if funding is available.

Conrail offered assistance with prototype testing if Bestrack got that far.

Eugene Cordani, the staff engineer for ACF Industries who designed the Trailer Train Railbox and the Southern Pacific Stack Car, agreed that Bestrack could be built, and was eager for ACF to become involved in the project. Virtually every rail car designer I talked to agreed that the car could be built.

Frank Shaeffer, associate editor of Modern Railroads, a "state of the art" industry magazine, was impressed by the system, and thought that it had great potential.

Pioneer International, the seed corn company, wrote a major feature on Bestrack in their grain transportation newsletter.

Kent Jones, the commissioner of agriculture for North Dakota, also expressed interest, and said that he has been thinking along similar lines as a solution to grain transportation problems which are not unique to North Dakota.

Even Brazilian National Railways was impressed, and wanted to be kept posted for the future. Other positive responses could be mentioned, but the list becomes repetitious.

With these affirmative responses, why did financial support lag? An internal memo at the Norfolk & Western Railroad said that "the concept appears to have merit" but that a "wait and see" course should be followed.

The Burlington Northern Railroad, which also expressed interest said, in effect, "We don't traditionally get into a project of this sort at this early stage.

"We suggest that you get in touch with a railcar manufacturer, although we would like to be kept posted."

Other railroads offered basically the same response.

Railcar manufacturers, meanwhile, had their own problems. In 1981, new railcar deliveries fell to a 19-year industry low. Most manufacturers were more worried with staving off bankruptcy rather than entering into a high risk, expensive new research project.

Another problem was that the industry was becoming a little gun-shy after seeing the high cost and low return that seems to have befallen North American's Roadrailer.

Response after response stated, "See us when you are further along," or, "Come back when you have detailed engineering drawings or a prototype."

Having been unsuccessful in attracting a major corporation, I turned to governmental and nonprofit sources. Here again, interest was good, but front money was negligible.

Federal Railroad Administration research dollars, which funded the 1978 intermodal study, had dried up. The USDA Office of Transportation has expressed interest and wants to be kept posted, but has no available resources, given existing priorities.

Even the Iowa Corn Promotion Board, which is a check-off agency with a small pool of research dollars, is unable to help financially at this time. "Revenues are down, due to slow corn movements, and current projects are taking all available research dollars."

Even so, "Bestrack would certainly revolutionize the grain industry should it come to pass."

Besides the size of the project, and the state of the economy, Bestrack has some imagery problems which, I am sure, contribute to the reluctance of the industry to invest in it.

Bestrack is a revolutionary, rather than an evolutionary, intermodal concept. Almost every component part will have to be designed individually.

Had I devised a more efficient hopper bottom, or something else that would fit on a conventional freight car, my chances of success might have been greater.

Also, not only is Bestrack revolutionary in design—it is revolutionary in operational concept. Innovative thought takes time to soak through an industry that took 20 years to adjust to the diesel locomotive.

Besides being operationally revolutionary, it is revolutionary in the opposite direction of the main school of management thought within the industry. Bestrack tends to decentralize operations rather than to centralize them.

For years, the industry has been moving toward centralization of facilities for intermodal operation, and for years, it has been moving to unit trains in agriculture.

While this centralization speaks to the most attractive economic need for the railroads, it fails to speak to the most attractive economic need of a substantial number of agricultural producers and users.

Another question concerning Bestrack which slows the industry down, is the question of who gets the immediate economic benefit?

Operated in a conventional, highly centralized piggyback environment, Bestrack would only be marginally more efficient than the existing system, on an economic equivalent with Roadrailer.

In Bestrack's replacement of a jumbo hopper car on certain moves, the rail movement costs actually go up very slightly.

Although no one can argue that the total cost of grain movement would go down with the use of Bestrack, railroads quite naturally want to suboptimize their portion of the grain haul, even if the cost of the overall movement is higher under the existing system.

Since the grain industry seems to be the principal beneficiary of Bestrack one might ask, "Why not approach the major grain companies? Surely they will have an interest in lowering grain costs, and will have sufficient clout to encourage the railroads to go along."

If you think that, you talk to Cargill. Cargill has 167 elevators, most of which are on main lines, and most of which are terminals with unit grain train capabilities.

To promote a system like Bestrack would tend to undermine a capital structure which they have taken years to develop. Smaller off-rail elevators and farmers who might benefit from the opening of new, intermediate haul markets, are not organized in a manner to handle a research project such as Bestrack.

My problem in short, is that I have an expensive, innovative system which offers the potential of tremendous savings to agriculture and other industries which deal in bulk movement.

Unfortunately, no institution which services agriculture seems to be in a position to offer financial support.

Bestrack, or an idea like it, can and will ultimately succeed. Time, however, for myself, and for the productivity of agriculture, slowly moves on.

America cannot afford to ignore any new ideas which can potentially increase productivity.

What I and the Institute are asking, in our own different ways, is help for the gamblers and dreamers, so that new concept technologies, for which there is yet no constituency, may be developed. Constituencies for those new products will naturally follow as the outcome.

Thank you, Mr. Chairman, for the opportunity to appear before you today.

[The prepared statements of Mr. Pikarsky and Mr. Krause follow:]

TESTIMONY OF MILTON PIKARSKY
BEFORE THE SCIENCE AND TECHNOLOGY SUBCOMMITTEE,
COMMERCE COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

April 5, 1982

Mr. Chairman, Members of the Committee:

My name is Milton Pikarsky; I am the director of Transportation Research at the Illinois Institute of Technology, Research Institute. I am appearing today with Mr. Bob Krause who is a former state legislator from Iowa and Chairman of the Iowa House Committee on Transportation.

We are here today to discuss the need for a well organized, long term research program within the railroad freight industry and to outline certain areas that deserve special consideration. An economically viable railroad freight industry will offer many benefits to the public at large including the provision of low cost services for the movement of many commodities and for the minimization of the use of limited petroleum resources.

It is the function of research to create an environment which encourages the introduction of new technologies which will have real economic benefits. The limitations on research spending we see today are barriers themselves, to technological utilization and thus will have a substantial effect on the long term economic viability of the railroad industry.

Acceptance of technology by the railroad industry is severely limited by the economic condition of the industry and by the relatively long life of its current assets. Otherwise interesting new technology cannot be given consideration because of the great demands for capital for new yards, for improved track structures, for locomotives and equipment, and for signaling systems and computers, all of which are essential for continued operation. The industry is always in position of having to face great competition for capital, and new and relatively untried very expensive techniques are generally unattractive. The industry has shown a great willingness to adopt technology when significant improvements can be identified and the cost is modest.

I feel strongly that in today's difficult economic situation that not only is it the appropriate role of government to encourage additional research, it is critical to the long term economic well-being of our country.

In particular, I feel that the following areas deserve greater attention:

1. Energy conservation
2. Safety standards
3. Hazardous materials movement
4. Innovative technologies for the movement of bulk commodities

Mr. Krause will address this last point in greater detail.

ENERGY CONSERVATION

The need for energy conservation is one of the principal concerns for the industry at the present time. The cost of fuel on most railroads has increased to the point where it is almost as high as direct labor costs. Therefore, one of the major areas of of future research would be for the development of more efficient locomotive and locomotive operating procedures. In the days of low fuel costs the railroads could be tolerant of operating practices which resulted in a low efficiency for the conversion of fuel energy into useful work. This can no longer be tolerated.

There is the need for the development of new and improved training methods so that operators can learn more efficient ways to use existing equipment. Many of the practices which have been followed in the past to control a train (e.g. power braking) result in wasted fuel energy. Many railroads are pursuing an aggressive program in the use of evaluators or simulators for training their personnel to follow operational techniques which result in lower fuel usage. The Railroad and Locomotive Evaluator/Simulator (RALES) facility, which is now under cinstruction and will be installed in the IIT Research Institute (IITRI) in Chicago, Illinois, will be an advanced facility of this type.

The RALES facility will provide complete simulation for the operation of a railroad locomotive. It is being configured to duplicate all features and controls of an SD 40 locomotive, and will have the capability for representation of other cab arrangements. The facility will provide high quality visual simulation of the view from the engine operating position. It will also contain computer simulation of all engine functions so that the visual display will accurately reproduce the motion of the train, which results from the operation of the locomotive controls. The facility will also have the capability to record an accurate description of all significant train operating parameters, such as air brake functions, coupler force, slack run in or run out, fuel consumption, etc.

The facility will provide vibratory motions to the cab to reproduce those which would be experienced when operating at different speeds. Motions which simulate the effects of slack run in and run out will also be included.

The RALES facility was originally designed as a research tool for providing the data on the performance of engine crews during simulated train operation, but it will also be available for conducting training programs for railroad personnel.

In addition, the railroads need to continue research on alternate energy sources. In recent years much attention has been given to the possible use of electrification so that coal or nuclear energy can be substituted for petroleum. The result of these studies has shown generally that this is not an economically satisfactory answer because of the large investment that is needed for electrification. Research should be continued on alternate methods of energy conversion and utilization which would take advantage of the unique characteristics of a railroad. For example, maximum weight is not a critical parameter and power sources much larger than those used on highway vehicles can be employed.

RESEARCH DIRECTED AT THE IMPROVEMENT IN DESIGN SPECIFICATIONS AND SAFETY STANDARDS

A second major area of research which should be given high priority is the study of ways for making more effective use of industry design standards and both industry and government safety regulations. Better understanding is needed in this area so that railroad facilities and equipment can be used more efficiently. For example, the rate of track deterioration is of major importance to railroad operations. The effect of the use of heavy equipment and large capacity cars on the rate of wear, development of rail cracks, road bed settlement, etc. is not precisely known. The use of lighter equipment may be more cost effective when all factors are considered, but because the basic parameters affecting track damage have not been adequately determined, the optimum set of conditions is not known.

As another example, one can consider the track standards which supposedly will provide for safe operations. For example, allowable operating speeds are given as the function of permissible variations in track geometry. It is possible that much unnecessary work is being done to maintain a certain level of track conditions which have no economic or safety benefit. Also, it may be more profitable to work toward the development of equipment which has a broader toleration of track variations so that operations could be permitted over more irregular track. Much important work is being conducted on these particular areas at the present time. The tests being conducted at the Facility for Accelerated Service Testing (FAST) at the Transportation Test Center (TTC) is a good example of this. The rates of wear and track degradation are being studied as a function of various operating parameters. As part of this work, a number of tests are being conducted to determine the actual force magnitudes which exist at the wheel-rail interface. This has required the development of new wheel -rail load measurement techniques which are providing an adequate description of this environment which has been very difficult to measure in the past. The forces are highly transient in nature and affected by many parameters such as the particular design of the car suspension and truck system and the condition of the rail and road bed. Methods for improved measurement and the analysis of data from this type of test work should be encouraged.

Many of the design standards which are used to specify the strength of railroad components had been developed on the basis of experience and the margin of safety which is present in these requirements is not fully understood. A greater understanding of the many factors which affect the reliability and structural integrity of these components is important. A good example of this is the railroad wheel. The failure rate of wheels in service is very low, but when they fail suddenly by fracture there is the possibility that a very serious accident may result. Many in the railroad industry believe that wheel failures are one of the most serious railroad safety problems. Wheel failures have catastrophic potential such as experienced in Laurel, Mississippi and Waverly, Tennessee where wheel failures caused the derailment of hazardous material tank cars which lead to fatlities, injuries and property damage. There are many uncertainties still in the type of safety criteria which should be used for wheels. For example, there is considerable disagreement as to tolerable crack sizes and characterization of other wheel defects. Brake applications can adversely effect the susceptibility of wheels to failure by creating too much heat in the wheel resulting in an overstressed condition. Much work is required to fully understand the significance of this problem and ways for combating it. Present rules require the removal from service of wheels which given evidence of having been overheated by the indication of a discoloration around the rim of the wheel. There is a need for extensive test work to be performed to determine precisely how the overheat condition is related to wheel failure. The development and use of special test facilities to conduct this type of research is recommended. Results of this work would lead to an understanding of what the proper margin is for the operation of this equipment.

Another reason for the improvement of design standards and specifications is the increasing shipment and sale of many foreign products to the railroad industry in the U.S. Over the years relationships have developed between the railroads and the U.S. supply industry which has generally resulted in a high quality level of products. Recently there has been increased pressure to accept imports from foreign manufacturers for use of U.S. railroads. In some cases the design standards which have been in effect for U.S. equipment do not adequately treat all the factors that are of importance for the use of the equipment because they are based on a mutual understanding of conditions which are maintained between the supplier and user. With the introduction of a more diverse range of equipment there is a constant need to upgrade and review the standards which have been used in the past and to determine their suitability for present market conditions. Where problems are evident additional work must be devoted to the improvement of these specifications through research programs which assess all pertinent factors.

SHIPMENT OF HAZARDOUS MATERIALS BY RAIL

A third area of importance for research in railroad technology is a continuation of studies to reduce the risks to the public of moving hazardous materials by rail. Rail is the ideal mode for bulk load shipments of chemicals. There have been numerous accidents in the past involving the release of toxic or flammable materials which have resulted from train derailments. These have caused fatalities, injuries, property damage and wholesale evacuation of communities. Much work has been done to improve the safety of the transportation of these hazardous materials by rail such as the regulations covering equipment designs for carrying liquified flammable gases under the rulemaking procedures of the MTB. These regulations, however, have pertained only to tank cars carrying certain types of hazardous materials and there are other tank car classifications which are authorized to carry other hazardous materials. Work must be continued to determine how additional regulations can be written which will protect public interest and yet not prove to result in an economic penalty for the industry.

Another problem is related to the shipment of nuclear waste materials which are expected to increase significantly in the future as nuclear power plants reach waste storage capacity limits. Previous work on containers for the shipment of these materials have indicated that they can be made strong enough to resist puncture, but that they may be susceptible to damage and release of harmful radiation if involved in fires. Work should be continued to determine optimum strategies for the transportation of this class of material. The shipment by rail of cryogenic materials is also expected to increase. Many of these materials are both toxic and flammable and there are no current requirements that rail cryogenic cars have fire protection.

It has been found that many accidents involving the rail shipment of hazardous materials have occurred not due to the accident itself, but due to improper wreck clearance and emergency response procedures after the accident. For example, at Waverly, Tennessee, a tank car explosion occurred two days after the accident. There are many differences in opinion concerning the proper response to specific accident scenarios. More work is required to determined a general set of guidelines which will encompass all possible emergency situations.

Another problem with the rail transportation of hazardous materials is that attempts are being made by many states and localities to prohibit or restrict the shipment of hazardous materials through highly populated areas. However, it often is found that circuitous routing may increase the risk because of additional switching operations or the movement on track which has a higher accident probability. Work must be directed at the development of procedures and equipment for minimizing risks to the public. It should be recognized that there is always some chance, although a very remote chance, of a failure wherein a severe threat to public safety would result. These risks must be better understood and procedures must be developed for dealing with the remote possibility of very serious events.

INNOVATIVE TECHNOLOGIES FOR THE MOVEMENT OF BULK COMMODITIES

A final area that is becoming increasingly critical is in the development of new technologies to improve the efficiency of moving bulk grain from farm to market. Massive branch line abandonment may have been necessary for industry, but they are having a disastrous affect on the American farmer.

One concept that has received some attention over the years is the one area of intermodal transportation.

Mr. Krause will speak in greater detail about the potential benefits to be gained by a greater use of innovative intermodal technologies but let me conclude with a brief history of the concept.

The concept of intermodal transportation was first tested in 1926 on the Chicago, North Shore and Milwaukee railroad in service between Chicago and Milwaukee. Growth of this Piggyback concept was rather slow until the service was marketed in the late 1950s as an innovative means of combining the low cost of rail-line haul with the flexibility and speed and highway transport pickup and delivery. By the 1960s, Piggyback shipments were growing at the rate of 10% per year, however, the rapid expansion of the Interstate Highway System and deteriorating services provided by the railroads have slowed the growth of Piggyback loadings. In 1977, the revenues for trailer-on-flatcar (TOFC) totaled 7% of all rail revenues, and TOFC carloadings accounted for 7% of the total. Average revenue per ton figures for the same year were $14 for general rail freight, 30 for TOFC and $35 for motor freight.

The railroad companies have concentrated their TOFC and container-on-flatcar (COFC) terminals at traditional rail centers. These terminals have become very large, utilizing expensive, but highly efficient equipment for the loading and unloading operations. Corridors have been established between these large terminals to provide overnight services between cities up to 500 miles apart.

At the same time, railroad line mergers and rail line abandonment have left many communities without the benefit of rail service.

Equipment and systems designers are attempting to develop the intermodal systems of tomorrow. These systems must provide the national freight transportation service that will make the best possible use of scarce and expensive energy resources. At the present time, there are no less than nine innovative intermodal concepts being tested on the nation's railroads.

The most innovative and cost effective systems utilize a highway trailer which can be converted to railway use without a flatcar, and can be readily transferred from the highway mode to railway mode and vice versa at any siding without expensive transfer equipment.

Mr. Bob Krause has invented a system called BESTRACK (an acronym standing for Bimodal Energy Saving Truck-Rail Articulated Container.) BESTRACK will eliminate the need for a flatcar bed for Piggyback and the need for elaborate load/unload facilities for Piggyback.

In 1978, The Department of Transportation commissioned an extensive study of all existing proposals for improving the national intermodal system. The purpose of the study, "Systems Engineering for Intermodal Freight Systems Phase 1", by Peat, Marwich, Mitchell and Co. and Associates, was to identify and recommend for development that system which seemed most economically and technologically feasible. The study recommended "Roadrailer" as its choice for further development.

Since 1978, Roadrailer has been tested and currently Illinois Central Gulf (ICG) has leased 80 Roadrailers which are in operation between Memphis and Louisville. An article in the August 10, 1981 issue of Railway Age states that the Roadrailer system has accomplished a 19% cost savings over conventional Piggyback service.

The BESTRACK system promised to provide even greater savings since trailers can be transferred at any railhead.

It is believed that the BESTRACK system will provide the most cost-effective method of handling grain from regional grain elevators which are no longer serviced by rail lines to consumer or export elevators. An economic evaluation of the BESTRACK system should be conducted so that the potential for BESTRACK can be compared with other systems currently being evaluated.

COMING SOON:

A NEW GENERATION LOCOMOTIVE AND TRAIN SIMULATOR

Today, railroads are facing new challenges in the training of train handling personnel. Railroads are continuously facing the challenge of developing new and better ways to do things. Railroads are: searching and developing efficient new designs in rolling stock; innovating and improving piggy-back loading and handling; developing powerful new energy efficient locomotives and improving their communications and control systems. A program initiated in the early 1970's, and scheduled to be operational during the latter part of 1983, will result in the addition of a new tool for training and train handling analysis. Under a contract with the Federal Railroad Administration, the IIT Research Institute, which is located adjacent to the American Association of Railroads' Chicago research and testing facility on the IIT campus, is to complete the development, design and installation of a Research and Locomotive Evaluator/Simulator (RALES). Further, IITRI is to maintain the completed RALES facility for a minimum 10 year period. The Federal government and the railroad industry will contract for the use of the evaluator/simulator at modest cost since the developmental, design and fabrication costs will have been essentially underwritten.

FACILITY

The RALES installation is being developed as both a training and research facility. It is anticipated that ancillary classrooms will afford the ability to provide instruction, under railroad direction, on basic track and car construction, general rules and safety regarding equipment and property, transportation rules, car air brake component parts and system operation, road air brake tests, the principles and concepts of train orders, locomotive air brake systems, track train dynamics and locomotive mechanical operations.

Initially, the RALES facility is being configured to duplicate all features and cab controls of a SD 40-2 locomotive. Provision for interchangeability with other cabs will be incorporated into the facility. Actual locomotive equipment is being used to the greatest extent possible.

The sound system will simulate aural cues associated with locomotive and train operations. Representative sound simulations will include such items as:

- Diesel engine operation from minimum to maximum RPM, including rumble, turbocharger whine, general engine roar and transition:
- Air brake sounds caused by automatic brake application and release, independent brake application and release, independent brake bailing and emergency brake application;
- Track clatter;
- Manual sander, including a "banging" sound as the sanding level is put into an ON position, and an air release sound as the lever is returned to the OFF position;
- Traction motor and generator whine as a result of motoring and dynamic braking;
- Air horn, with the sound amplitude as a function of horn lever position;
- Exploding torpedo;
- Highway crossing bells, including Doppler effect;
- Train bell;
- Penalty brake whistle;
- Alarm bell; and,
- Trainyard background sounds.

A high quality visual simulation of the view from the engine operating position will be provided. The visual images will be fully coordinated with the sound and motion systems, and will permit selection and use of alternate track sections or views without stopping the display. Engine functions and train operating parameters, such as air brake functions, coupler force, slack run in or run out, fuel consumption, train speed, wheel slip indicator and sand on indicator, will be included.

Motion simulation will include a six-degree-of-freedom design which will provide vibratory motions to the cab to reproduce those which would be experienced when operating at various speeds. Also included will be simulated motions and effects of slack run in and run out.

A control console will be provided which allows for the establishment of the initial conditions for each simulated train run, and the preprogramming of events which are to occur during the course of the run. It will be possible to immediately recall a preprogrammed event so that an identical run can be repeated many times. There will be the ability to select from one to 10 power units for the head end of the train plus from one to five power units as a remote consist operating at a selected position within the train under locotrol or as a helper locomotive. Train consists can be made up of cars, the characteristics of which will be individually selectable. Car characteristics include:

- Car weights;
- Car lengths;
- Three classifications of brake shoes;
- Three classifications--AB, ABD or ABDW--of brake valves;
- One or four position retainer valves; and,
- Break-in-two force, depending on couplings chosen.

APPLICATION

As a research tool, the evaluator will be capable of collecting data to describe the response of engine crew members and their performance utilizing various operator procedures, operator aids, locomotive cab environments and work/rest cycles. A major design objective for the facility was to make the environment for the engine crew as realistic as possible so that experimental results would have valid application in the field.

The facility will also be used for safety studies. Accident producing situations can be simulated, such as conditions which duplicate the collision of a train with a fixed object, or the operation of train controls in such a manner likely to cause derailment of cars within the train. Safety studies can also be conducted by recreating accident situations to determine the significant factors which entered into the causation of the accident, and the indication of corrective measures, which can be taken to reduce the probability of such events.

The facility can also be used for training railroad engineering personnel and operating crews. It is not anticipated that the research and safety studies will occupy more than a small percentage of the available time so that it will be possible to use the evaluator as part of training programs. Situations could be created on the simulator which are important for train operational control. The duplication of these situations could be undertaken much more efficiently than through full scale field operations.

TRAINING ISSUES

The cooperation and advice of the railroad industry -- both management and labor -- is desired to ensure the evaluator/simulator becomes a useful facility. Among the training issues which must be considered are:

- The role of the simulator in the development of training programs;
- The need for additional training facilities to implement the evaluator when used in an overall training program;
- The use of railroad personnel to provide instruction;
- The need for photography to provide scenes from those railroads using the facility;
- The size of the group that would be included in each training session; and,
- The particular types of simulation which are important for training purposes.

The FRA contract with IITRI for the RALES program is under the general direction of Milton Pikarsky, Director of Transportation Research; IIT Research Institute; 10 West 35th Street, Chicago, Illinois, 60616; (312) 567-4009.

IIT Research Institute (IITRI) is an independent, not-for-profit contract research organization that has served government and industry in the fields of life sciences, chemistry, electronics, materials technology, transportation, and engineering research since 1936. With more than 800 research projects undertaken annually, IITRI's yearly research volume approaches $60 million. The total staff numbers over 1,500.

TESTIMONY OF ROBERT A. KRAUSE
BEFORE THE SCIENCE AND TECHNOLOGY SUBCOMMITTEE,
COMMERCE COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

April 5, 1982

Mr. Chairman, Honorable Members of the Committee:

My name is Bob Krause, I am the inventor of an intermodal transportation system called "Bestrack". I have attached some descriptive material on Bestrack as an appendix to my testimony.

The Bestrack system, as proposed, has operational features which make it ideal for the movement of high density bulk commodities to and from rural areas. Although some savings in the system can be attained in the rail line haul on certain types of goods, the primary Bestrack savings come from its ability to make expensive railhead facilities for the movement of grain and fertilizer unnecessary.

Net savings at the railhead gained by adopting this system to avoid terminals can amount to about six cents per bushel on grain. Multiple terminal avoidance can be gained on some types of hauls, which could save considerably more. Although some of the net railhead savings is dissipated in the line haul (see appendix B), economics and quality control justify its use in many markets.

To give you an idea of the magnitude of the possible savings which could be generated for American agriculture with this system, consider America's last year's corn crop. It amounted to 8 billion bushels. If six cents were saved on every one of those bushels, it would create a total annualized savings of $480,000,000.

All corn of course, would not move by Bestrack. There are, however, many other farm commodities besides corn which could benefit from Bestrack, and a portion of the potentially vast savings would certainly acrue to the farmer.

Just as important as the dollar savings Bestrack could generate, is the opportunity for the farmer to have greater control over his own economic destiny. An old saying in the grain trade is, "He who controls the storage, controls the market." Accordingly, placement of terminals and their necessary storage facilities, is an important economic issue. Bestrack can eliminate most of the need for intermediate storage between the farmer and the ultimate consumer of the grain. This will have a tendency to force new growth in storage nearer the producer, and nearer the consumer. This would weaken the influence of the middleman in the grain marketplace.

Because of my background, I am especially sensative to the problems which have historically prevented the intermodal movement of agricultural commodities.

Generally, those problems are: the high equipment weight of existing intermodal equipment, the need for dispersed low density on and off load points, and the need for high strength equipment which can integrate into conventional rail hauls.

I recognized that none of the intermodal proposals discussed in the U.S.D.O.T. study targeted specifically on these agricultural needs. Many of the proposals, including Roadrailer by North American Car Company, had problems with either rail mode or highway mode equipment weight. The study itself seemed to avoid this entire issue by targeting on a representative study payload weight which was three tons less than a normal maximum highway payload weight.

Other proposals were refinements to existing piggyback systems. These proposal required expensive centralized crane or gantry facilities which are unsuitable for rail bulk movements.

Other proposals lacked equipment strength, and the ability to integrate into conventional freight movements. Imagining that I could do better by concentrating on those needs, I began the work that resulted in the creation of Bestrack. Many people feel that the Bestrack concept may overcome those problems.

Dr. Phillip Baumel of Iowa State University, a nationally recognized grain transportation economist, and past chairman of the U.S.D.A.-U.S.D.O.T. National Rural Transportation Task Force, thinks that Bestrack has great merit, and has volunteered to do the economic analysis, if funding is available. Conrail offered assistance with prototype testing if Bestrack got that far. Eugene Cordani, the staff engineer for ACF Industries who designed the Trailer Train Railbox and the Southern Pacific Stack Car, agreed that Bestrack could be built, and was eager for ACF to become involved in the project. Virtually every rail car designer I talked to agreed that the car could be built. Frank Shaeffer, Associate Editor of Modern Railroads, a "state of the art" industry magazine, was impressed by the system, and thought that it had great potential. Pioneer International, the seed corn company wrote a major feature on Bestrack in their grain transportation newsletter (see appendix D). Kent Jones, the Commissioner of Agriculture for North Dakota, expressed interest, and said that he has been thinking along similar lines as a solution to grain transportation problems which are not unique to North Dakota. Even Brazilian National Railways was impressed, and wanted to be kept posted for the future. Other positive responses could be mentioned, but the list becomes repetitious.

With these affirmative responses, why did financial support lag? An internal memo at the Norfolk and Western Railroad said that "the concept appears to have merit. . ." but that a "wait and see" course should be followed. The Burlington Northern Railroad,which also expressed interest said, in effect "we don't traditionally get into a project of this sort at this early stage. We suggest that you get in touch with a railcar manufacturer, although we would like to be kept posted." Other railroads offered basically the same response.

Railcar manufacturers, maeanwhile, had their own problems. In 1981, new railcar deliveries fell to a 19 year industry low. Most manufacturers were more worried with staving off bankrupcy rather than entering into a high risk, expensive new research project. Another problem was that the industry was becoming a little gun-shy after seeing the high cost and low return that seems to have befallen Norther American's Roadrailer. Response after response stated, "see us when you are further along . . .;" or "come back when you have detailed engineering drawings . . . or a prototype."

Having been unsuccessful in attracting a major corporation which is established in the rail industry, I turned to governmental and non-profit sources. Here again, interest was good, but front money was negligible. Federal Railroad Administration research dollars, which funded the 1978 intermodal study, had dried up. The U.S.D.A. Office of Transportation has expressed interest and wants to be kept posted, but has no available resources, given existing priorities. Even the Iowa Corn Promotion Board, which is a check-off agency with a small pool of research dollars, is unable to help financially at this time. "Revenues are down, due to slow corn movements, and current projects are taking all available research dollars . . . ." Even so, "Bestrack would certainly revolutionize the grain industry should it come to pass."

Besides the size of the project, and the state of the economy, Bestrack has some imagery problems which, I am sure, contribute to the reluctance of the industry to invest in it.

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Also, not only is Bestrack revolutionary in design-- it is revolutionary in concept. Innovative thought takes time to soak through an industry that took twenty years to adjust to the diesel locomotive.

Besides being operationally revolutionary, it is revolutionary in the opposite direction of the main school of management thought within the industry. Bestrack tends to decentralize operations rather than to centralize them. For years, the industry has been moving toward centralization of facilities for intermodal operation, and for years, it has been moving to unit trains in agriculture. While this centralization speaks to the most attractive economic need for the railroads, it fails to speak to the most attractive economic need of a substantial number of agricultural producers and users.

Another question concerning Bestrack which slows the industry down, is the question of who gets the immediate economic benefit. Operated in a conventional highly centralized piggy-back environment, Bestrack would only be marginally more efficient that the existing system, on a plane with Roadrailer. In Bestrack's replacement of a jumbo hopper car on certain moves, the rail movement costs actually go up. Although no one can argue that the total cost of grain movement would go down with the use of Bestrack, railroads quite naturally want to sub-optimize their portion of the grain haul, even if the cost of the overall movement is higher.

Since the grain industry seems to be the principal beneficiary of Bestrack one might ask, "Why not approach the major grain companies? Surely they will have an interest in lowering grain costs, and will have sufficient clout to encourage the railroads to go along." If you think that, you talk to Cargill. Cargill has 167 elevator, most of which are on main line, and most of which are terminals with unit grain train capabilities. To promote a system like Bestrack would tend to undermine a capital structure which they have taken years to develop. Smaller off-rail elevators and farmers who might benefit from the opening of new, intermediate haul markets, are not organized in a manner to handle a research project such as Bestrack.

My problem in short, is that I have an expensive, innovative system which offers the potential of tremendous savings to agriculture. Unfortunately, no institution which services agriculture seems to be in a position to offer financial support.

Bestrack, or an idea like it, can and will ultimately succeed. Time, however, for myself , and for the productivity of agriculture, slowly ticks on. America cannot afford to ignore any new ideas which can increase productivity.

What I and the Institute are asking, in our own different ways, is help for the gamblers and dreamers, so that new technologies, for which there is yet no constituency, may be developed. Constituencies for those new products will naturally follow as the outcome.

Thank you, Mr. Chairman, for the opportunity to appear before you today.

Appendix A

DISCUSSION OF GRAIN MOVEMENT POSSIBILITIES USING THE BESTRACK GRAVITY FLOW CONTAINER SYSTEM

I. Domestic

As seen in the exhibit entitled "Proposed Grain Layout", a variety of options exist where the Bestrack system can be used to reduce costs when moving land-bound grain.

Understanding the Bestrack cost reductions is to recognize the costs involved in moving grain through an elevator or a terminal grain facility. This cost varies from $.08 per bushel for the most efficient unit grain train terminals, to $.17 to $.20 per bushel for smaller, less efficient facilities. Bestrack can bypass many of these facilities at a railhead transfer cost of $.02 per bushel.

This makes the net per bushel savings at the railhead with use of Bestrack, a minimum of $.06 per bushel, and often more.

In the rail mode proper, Bestrack is less efficient than the 100 ton hopper car. A Bestrack train would have a per container tare weight of 30% of a conventional hopper, while its payload would be 25% of a hopper car. This will cause a gradual deterioration of Bestrack's grain terminal cost reductions over distance (see chart "Bestrack's Grain Terminal Savings"). In spite of this deterioration, grain can be transported a considerable distance before all cost reductions are eliminated.

In calculating the need for Bestrack, it is important to calculate which markets best fit Bestrack's movement economics. Any farm commodity which is produced off the railhead, which has an intermediate distance haul, or which requires two or more trans-shipments could potentially take advantage of Bestrack.

This is not to say that Bestrack is meant to eliminate the

100 ton hopper car. However, using the 100 ton car for almost all grain moves, as is done today, is like saying that everyone who drives needs a four-door sedan. Bestrack can fit certain economic niches where the larger car does not fit well.

An attractive example of Bestrack finding an economic niche might be in the hauling of grain from grain surplus areas, such as Iowa, to feed grain areas to the east, west, and south. A fair amount of this grain currently moves by truck, because two elevator handlings can be avoided by taking this grain directly from the producer to the consumer.

Dry land wheat farming is another area where Bestrack economics appear to be attractive. Many of the rail lines in dry land wheat country were built with light rail which is unable to sustain the beating given it by 100 ton hopper cars. In addition, dryland wheat appears to be economically unsuitable for adaption to unit train loadout facilities as have been developed for other grains in wetter climates. The reason for this is that wheat is spread so thinly across the land that trucking costs to a high volume terminal become prohibitive. Bestrack appears to be a viable alternative to creating a new elevator cost barrier in this instance.

Another area where Bestrack characteristics would seem to be favorable is in movements where grain quality is exceptionally important, such as in moving consumption quality beans to market domestically or overseas. Here, Bestrack's single handling features offer advantages which can't be met either by hopper car or conventional container.

II. Overseas Export

Export grain via containership is currently more expensive than the movement of grain by bulk freighter. Bestrack movement could change the equation in certain circumstances.

The same make-bulk, break-bulk cost barriers that Bestrack eliminates domestically can also be eliminated for foreign markets.

Because the United States is a major grain exporter, the U.S. portion of the grain delivery system has gained greatly from volume efficiency. This is not usually the case in the receiving country. Lighters and other primitive break-bulk systems often result in wasteage, damaged grain, and other inefficiencies. Also, because foreign import needs vary dramatically from year to year, it is often impractical to build modern specialized facilities to handle the grain. By being able to utilize general cargo container ports (which constitute 50% of all the ports in the world), foreign importers might be able to gain in cost efficiency as well as in the condition of the grain received.

Containers have historically not been used for grain shipments because cost barriers created or left intact by the system overcome all cost advantages gained. Most grain is grown inland away from ports, and must be transported at least partially by rail. If containers are loaded inland, an on-rail loading facility is needed. This is the same cost barrier left intact by the 100 ton hopper car.

After loading the container, the container on flatcar is at an economic disadvantage with the hopper car. It's tare weight will be 100% of a jumbo hopper car, while it will be able to carry only 50% of a jumbo's payload.

Conversely, Bestrack immediately gains an almost immediate $.06 per bushel advantage from bypassing the loading facility.

It then keeps its rail disadvantage to a minimum by being only marginally more inefficient than a jumbo hopper.

This allow Bestrack, in certain cases, to arrive at port economically ahead of either the container on flatcar or the jumbo hopper car.

With Bestrack containerized grain already at port, two options exist. The grain may be unloaded for conventional bulk freighter shipment, or it may be left in the container for container shipment.

Ship loading procedures between bulk and container appear to be competitive. Port elevator charges for bulk handling of bulk run between \$.05 and \$.25 per bushel, depending on market conditions. Containership charges run at about \$.125 per bushel.

Sea carriage by container versus bulk appears on the surface to be competitive. A 1978 U.S. Department of Agriculture study cites bulk carriage from New Orleans to Rotterdam at \$.25 per bushel. A current quote (summer, 1981) from Sea Land for containerized carriage on the same route is \$.26 per bushel. Economic conditions could be a factor in the price closeness. A second, probably more critical factor in the price closeness may be the rapidity with which a container ship may be loaded and unloaded. This would allow less time for port tie-up and make for more rapid turn around.

Off-loading of bulk grain can be assumed to cost the same as loading, althouth the cost is actually probably higher, and container ship unloading can also be assumed to cost the same.

Land mode delivery operations using Bestrack would then retain the same favorable economic features which occurred domestically.

In conclusion, container movement of grain for export does not appear to be restricted as much by the ocean movement as it is by the land bound portion of the haul. Bestrack can do much to eliminate the land restrictions.

Total Flow Costing -- Containerized Bestrack versus Bulk

	Bestrack	Bulk
On Farm	same cost	same cost
Farm Transportation	same cost	same cost
Off Rail Sub-terminal	same cost	same cost
On Rail Load-out	less 6¢	plus 8¢
Rail Shipment	marginally higher	marginally lower
Port Handling	12½¢	5¢-25¢ (market determines)
Ocean Carriage	26¢	25¢
Port Handling	12½¢	5¢-25¢
Rail Shipment	marginally higher	marginally lower
On Rail Unloading	less 6¢	plus 8¢
Highway Movement	same	same

III. Grain Servie Considerations

Creating a throughput intermodal grain system such as Bestrack implies a major restructuring of grain industry functions. Bestrack eliminates the middleman. Can this be done without inconveniencing the processor/consumer? In many cases, the answer is yes.

Pre-packaging grain in a large container for final delivery to the processor/consumer is conceptually the same as delivering individual boxes of bran flakes and bran flakes with raisins to a consumer in a supermarket. Many of the same questions arise.

Can variety and quality be delivered to the consumer at the lowest possible cost? Can we identify high quality and low quality grain early in the movement process, or must we wait, and blend to the consumer's desire near the point of delivery?

These questions may best be answered by looking at the basic functions of a grain elevator. They are: drying, grading, blending, storing, marketing, transporting, and making trans-shipment. All of these functions must be considered in the creation of an intermodal grain system. When and where they can be done, and how often they are done, governs the flexibility and efficiency of the industry.

Drying of grain is performed early in the grain movement process. By the time grain passes the country elevator, it is all dried.

Blending and grading both occur at the country elevator. Both the blending and the grading function re-appear at each trans-shipment point.

Marketing occurs at the farm, at the country elevator, and at large terminal elevators. Marketing at large terminal elevators (usually trans-shipment points) is done by the large grain companies which own them.

Transport occurs from the farm, from country elevators, and from large terminal elevators.

Trans-shipment occurs at all stages where the need arises to shift grain from one movement container to another.

Storeage occurs at the farm, at the country elevator, at large trans-shipment facilities, and at the consumer's location.

Of these functions, all but drying is repeated in the movement chain.

Of the remaining functions, Bestrack proposes to eliminate most trans-shipping, and to consolidate the transport function. Will this have a negative impact on blending, grading, marketing, or storing.

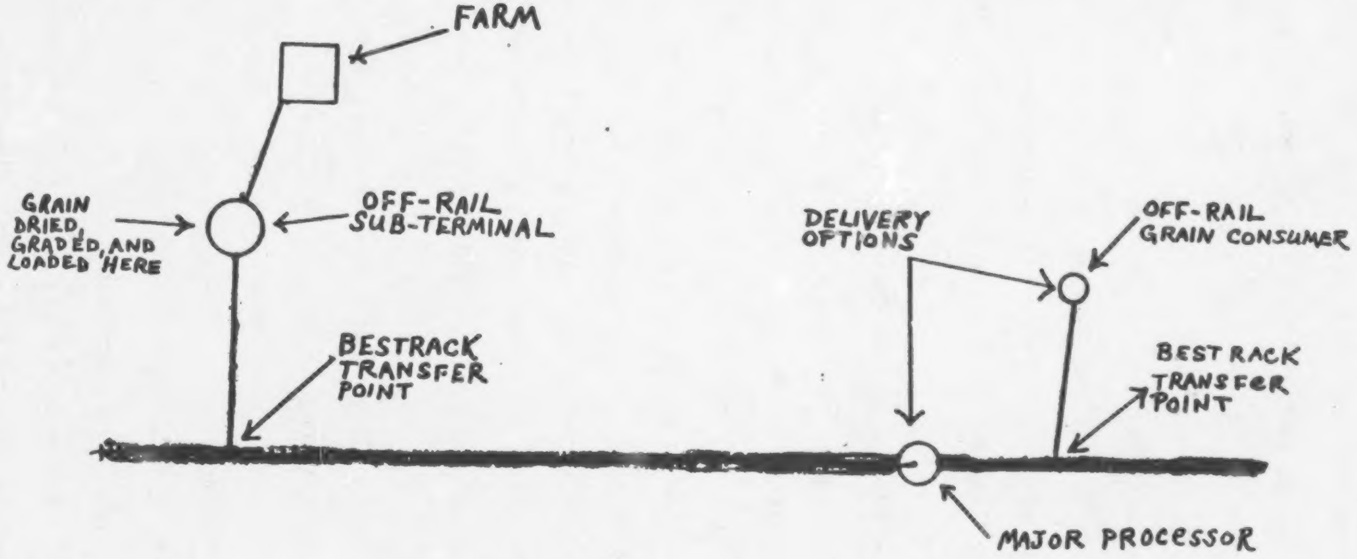
Marketing, in this instance, is the most important function to consider. With modern telecommunications, anyone with knowledge and a willing buyer can market grain. The trans-shippers, who are proposed to be eliminated with Bestrack, have derived their market power from their strategic locations. Although their market power is reduced by Bestrack, their ability to market grain is not.

Blending andgrading at the trans-shipment level is historically more a function of trans-shipment than marketing. It evolved naturally from co-mingling different source grains in larger carriers. Were a trans-shipment not to occur, final customer blending and grading would have to be done earlier in the movement chain. The movement itself would then have to be targeted directly toward the consumer. Given the Bestrack system, and given modern telecommunications marketing, it is not impossible to imagine that this could be made to happen.

Storeage is the final function in the equation. With direct telecommunications marketing, the need to store grain for movement at trans-shipment points is considerably reduced. Pinpoint storeage near the source of production for direct movement to the consumer becomes more important. Consumer storeage, possibly in the Bestrack containers themselves, becomes more viable.

The result of these changes would be to strengthen the market power of the producer and the consumer, while lowering overall system costs.

PROPOSED GRAIN LAYOUT (BESTRACK)



Code:
RAIL ▬
HIGHWAY
(80,000 GROSS AXLE WT.)

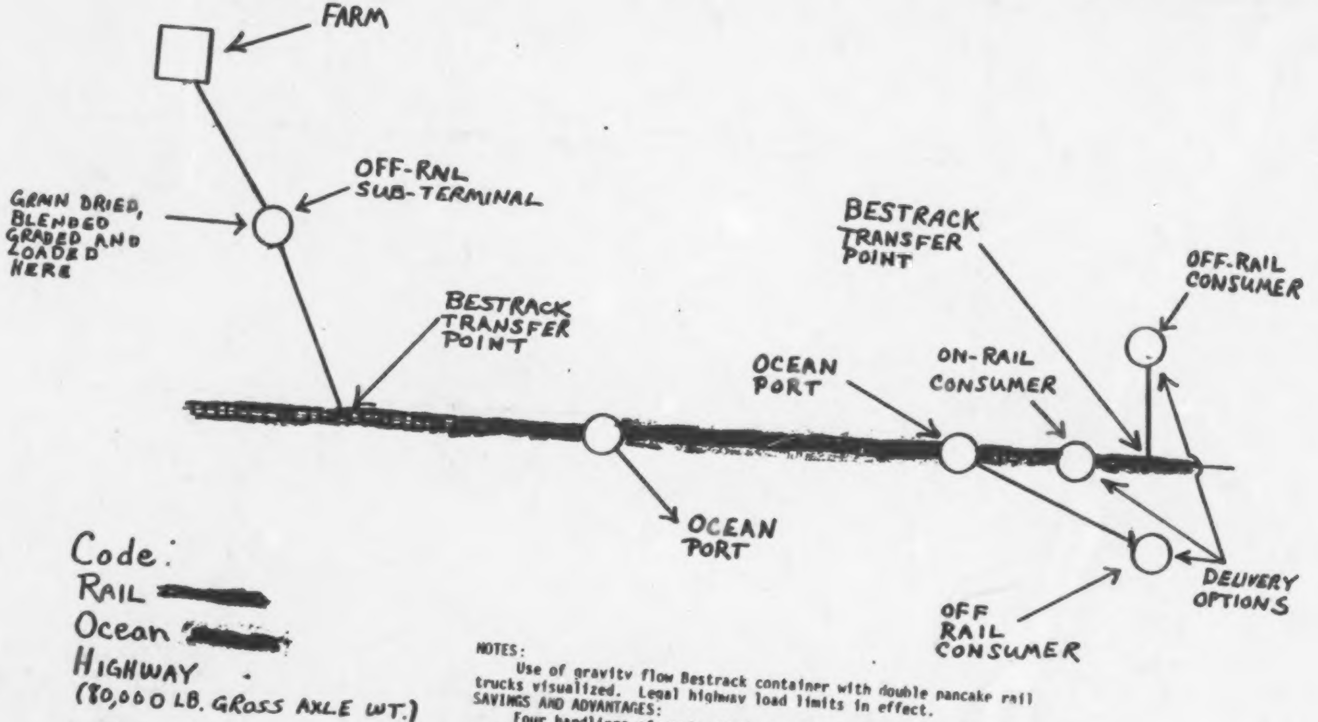
NOTES:

Bestrack gravity flow container with double pancake rail trucks visualized. Legal highway load limits in effect.

SAVINGS AND ADVANTAGES:

Two trans-shipments avoided from off-rail producer to off-rail consumer. One trans-shipment avoided from off-rail producer to on-rail consumer. Grain quality remains constant from point of production.

PROPOSED EXPORT GRAIN LAYOUT (BESTRACK)



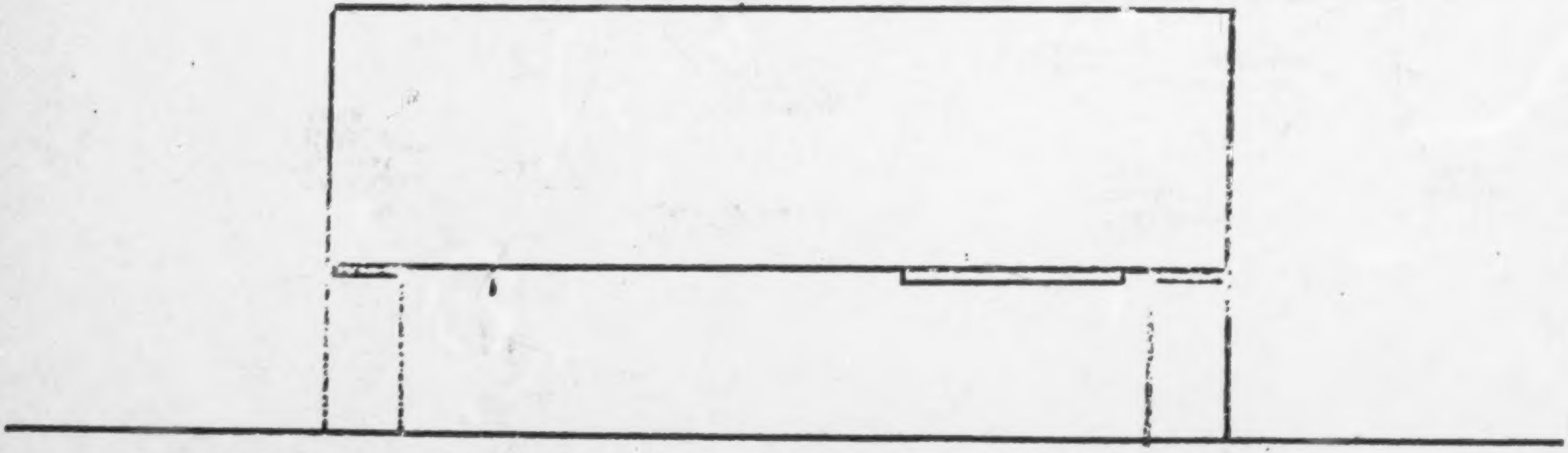
NOTES:

Use of gravity flow Bestrack container with double pancake rail trucks visualized. Legal highway load limits in effect.

SAVINGS AND ADVANTAGES:

Four handlings of grain eliminated in move from off rail producer to off rail consumer. Two of these eliminated handlings utilize the Bestrack transfer process, and thus reduce cost. The other two eliminated handlings, involving ocean handling, contribute to the quality of grain delivered.

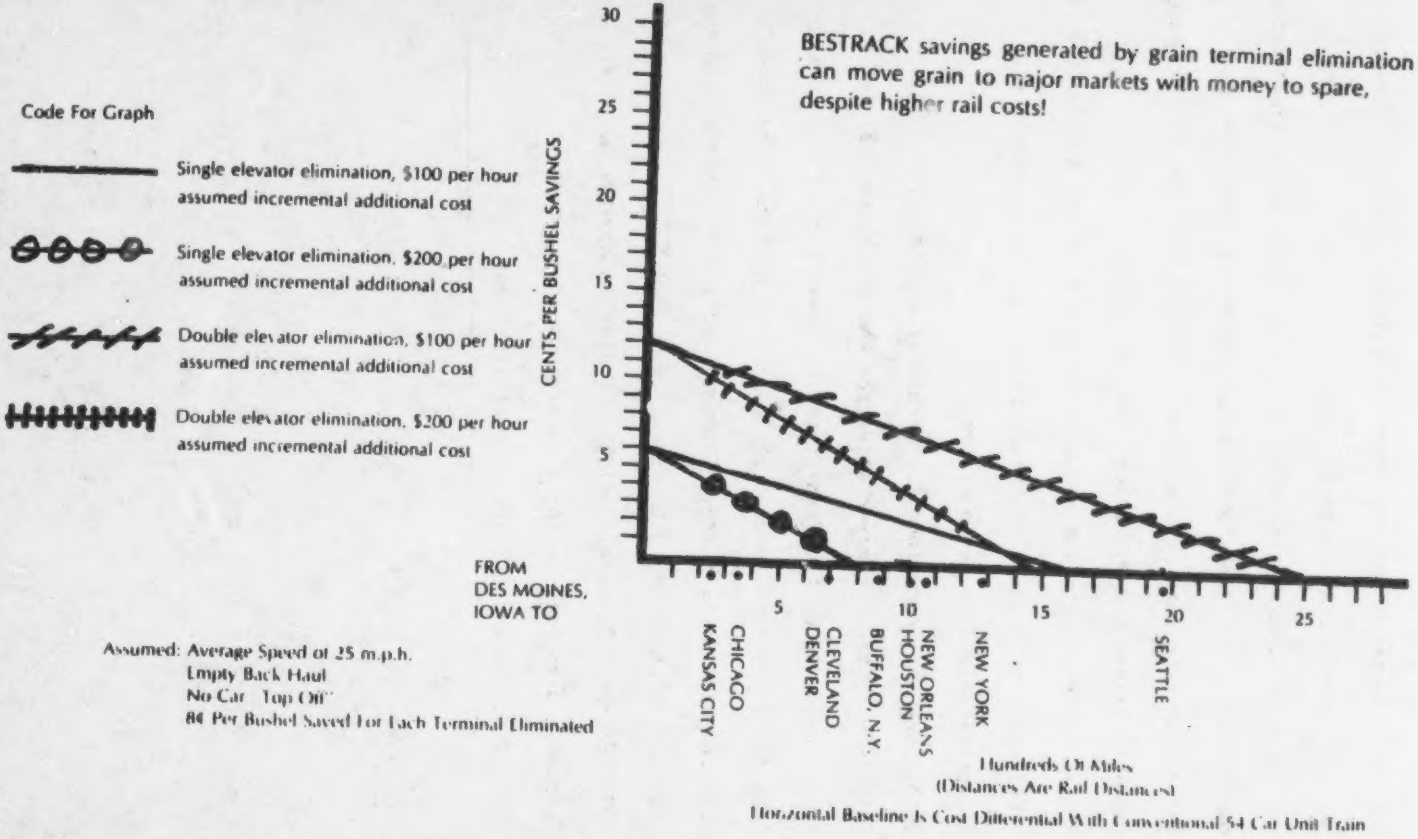
CONTAINER STOREAGE (BESTRACK)



Container is stored by transferring it to 48 inch high concrete posts, using conventional Bestrack transfer procedure. By eliminating highway or rail wheels during storeage, and thus freeing them for other containers, daily equipment lease costs can be reduced by 50%.

Appendix B

Bestrack Grain Terminal Savings



BESTRACK savings generated by grain terminal elimination can move grain to major markets with money to spare, despite higher rail costs!

Assumed: Average Speed of 25 m.p.h.
Empty Back Haul
No Car "Top Off"
8¢ Per Bushel Saved For Each Terminal Eliminated

Horizontal Baseline Is Cost Differential With Conventional 54 Car Unit Train

Appendix C

Background on Robert A. Krause

Current: Inventor and Developer of Bestrack, Farmer, Democratic candidate for state senate in Iowa.

1980-81. Regional Representative for the Secretary of Transportation for Region 7, covering Iowa, Kansas, Missouri, and Nebraska. Concurrent with this position was Coordinator in the field during the Rock Island and Milwaukee Railroad shut-down.

1979-80. Transportation manager for Land O' Lakes Agricultural Services, responsible for transporting farm input supplies to 800 cooperatives in seven states.

1978. Democratic nominee for treasurer of state for Iowa.

1973-1979. State representative for the 7th House district of Iowa. Chairman of the Transportation Committee. Farmed concurrently.

1968-1972. College student at University of Iowa. Graduated with B.A. in political science. Commissioned a 2nd lieutenant in the Transportation Corps, U.S. Army through R.O.T.C.

1972-Current. Continued military duties in Reserve and Guard. Currently a captain in the Iowa Army National Guard.

1950-1968. Raised on farm in northern Iowa.

APPENDIX D: Testamony of Robert A. Krause

NEWS GRAIN TRANSPORTATION

Much Rock Island Track Still In Use

The Rock Island Railroad may have gone out of business, but much of its track has not.

About 51 per cent of the original 7,100 miles of Rock Island track was in use at the end of June.

Of this total, 1,057 or about 15 per cent had been sold to other railroads. Another 2,545 miles or 36 per cent had been leased.

An additional 470 miles of track were earmarked for sale or lease. In the meantime, part of this mileage was also in use.

Some Track Being Dismantled

On September 24, the Rock Island trustees received permission to dismantle 782 miles of track. Of this total, about 345 miles or 44 per cent are in Iowa. Dismantling will take about a year, and railroads seeking affected track will still have an opportunity to submit bids for track until it is actually torn up.

Rails and other materials will be sold as scrap. Land that does not revert to farmers also will be sold. Eventually, an estimated 60 to 70 per cent of Rock Island track will be sold or placed under long term lease. This total could change depending on possible action by various states to buy track.

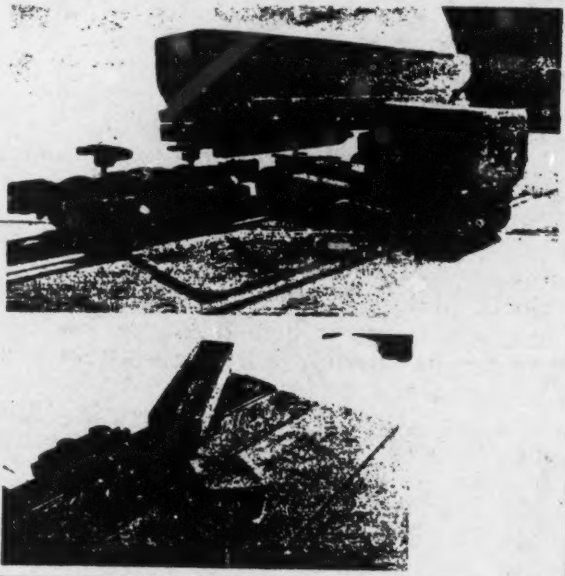
Iowa Taxing Railroads' Fuel

Iowa is a case in point. In August, the State of Iowa passed legislation levying a tax of three cents per gallon on diesel fuel used by railroads and paid by railroads operating in Iowa. This tax is to rise to eight cents on July 1, 1982. Funds raised by this tax would be used to back bonds for purchase of Rock Island track.

The future of this tax is currently in some doubt due to a suit filed by railroads. Both sides in the suit say they are optimistic about the outcome.

All cars of the defunct Rock Island Railroad, with the exception of those badly damaged, have been sold. Remaining cars had leases which lapsed. Rock Island land is currently being sold in parcels.

A New Approach to Moving Grain from Farm to Port?



Just as hopper cars are replacing box cars for rail movement of grain, Bob Krause believes his "Bestrack" system could offer further improvements over hoppers. These models built by Krause show essential parts of the system and how they would function. Special rail trucks are equipped with "pancakes" similar to the fifth wheel on a tractor, except they can be raised hydraulically to elevate the gravity-flow container. With the container elevated, highway axles can be positioned under one end of the container and a tractor under the other. Krause envisions the system allowing grain to be moved from farm to export point by truck and train in a single container, reducing handling of grain.

The upper photo shows the tractor backing under the elevated container, after rear trucks have been positioned under the container's other end. The lower photo shows the container as a highway carrier, leaving rail trucks behind. Krause welcomes inquiries about Bestrack; his address is P.O. Box 9200, Boulder, Colorado 80301.

Mr. **Glickman**. What is the status of the Bestrack system right now?

Mr. **Krause**. The status is that we have a small model made. We have done some initial economic analysis of some of the benefits. The Institute has helped me with building the cost projections on how much the economic analysis, the engineering, and the prototype costs would cost.

Mr. **Glickman**. I guess my question is who is going to pay for the demonstration and qualification of intermodal concepts like the Bestrack, assuming there aren't any Federal dollars to do that?

Mr. **Krause**. So far, nobody; that is where it sits.

Mr. **Glickman**. Let me ask Mr. Pikarsky a couple of questions.

You indicate that because of poor market conditions, there is a valid role for federally supported rail research and development.

So now we have both poor market conditions and poor Government economy conditions and we are not seeing very much research anyplace, private sector or Government.

Where does that lead us?

Mr. **Pikarsky**. I believe that Members of Congress, like yourself and others, have to really balance the use of scarce resources. There is great feeling that the loss of our economic status, the difficulties we are experiencing is in part a lack of putting the resources into research and development, for improving the technologies, for improving our productivity, for improving performance and that this is something which needs to be reviewed, modified, perhaps increased from the present level.

I believe that this Nation's technological position, status, is one that is becoming certainly more extant nationally as we see the progress being made in other countries, in the development of rail technology, in development of many of our other advanced technologies .

So in coming here, we are just trying to add our weight to the concern of many informed Americans that there needs to be a recognition that perhaps of the resources available, R. & D. must play a larger role.

Mr. **Glickman**. You mentioned the IIT Research Institute, under contract with FRA. You have this contract to maintain the rail simulator for 10 years?

Mr. **Pikarsky**. Ten years.

Mr. **Glickman**. What is the funding situation for that project?

Mr. **Pikarsky**. The funding situation is that when the Federal Railroad Administration decided they would not complete and operate that facility as a Federal program, IIT Research Institute entered into a cost-sharing contract where we will complete the development, design, and fabrication of the facility and will have to go into the market both working with industry, and presumably with Government, for research funds to utilize that facility which has been an investment by the Federal Government of something, I believe, in excess—or will have been an investment in excess of $10 million, and will be unique in the North American Continent. The Canadians have at the present time the most advanced simulator that is in existence—and the need for support to continue this program for a not-for-profit organization is one that is critical for us, too.

So it is our hope that in some of the actions that Congress takes, it considers the part of human factors being a significant cost of train accidents; size, weight, and length of trains have been increasing over the 10 years resulting in difficulty in train handling control; retirements of and average experience of remaining locomotive engineers are being alarmingly reduced; fuel costs have risen dramatically and are approximately 40 percent of the railroads operating budgets; those needs are Federal needs which are related to safety.

We hope that that is recognized in the actions that Congress takes and that, on that basis, we may be designated to do some of the work that needs to be done.

Mr. GLICKMAN. I would encourage you to keep us informed of the progress of this project.

I guess what I am saying is, with the money that the Federal Government has put in to date, I want to make sure that this project does not get lost in the process.

The AAR, the Railroad Association, has indicated that significant progress has been made in advancing the understanding of wheel-rail interaction and its effect on track life. They are planning to deemphasize this work in the future.

You suggest it is not well understood. I wonder if you might exlain the apparent difference of opinion?

Mr. PIKARSKY. I believe there may be some differences. I had been with Bill Harris who has been the vice president for engineering of the AAR. He indicated this is an area in which he felt greater attention is to be placed. He is the one who shared with me the figures of 15 million wheels in existence and the fact that we are taking out of service some 200,000 wheels without knowing whether, in fact, they are ready for incipient failure.

We are still having 400 incidents a year, which in many cases are very catastrophic in nature.

So the consensus, as I understand the railroad industry, is that today it is one of the most serious railroad safety problems.

There is considerable disagreement as to tolerable crack sizes and other wheel defects that exist.

Mr. GLICKMAN. So in your opinion, research should not be deemphasized in this area?

Mr. PIKARSKY. That is correct.

Mr. GLICKMAN. You indicate that additional research into the shipment of nuclear waste materials is necessary. Some States have refused the transit of the spent fuel based upon their serious concerns regarding potential accidents. What do you think the likelihood is of a catastrophic accident of rail cars carrying nuclear material?

Mr. PIKARSKY. The consensus of those people that I have talked to in emergency management areas is that rail would be the safer mode compared to highway shipment by trucks because they can be controlled, they are on a separate right-of-way, and because that containers can be made that would retain or contain or minimize any event that might occur.

So on the basis of safety, it would be a more safe method of handling equipment. It is rather interesting, however, that studies indicate that perhaps some of these containers or cars should be perhaps internal within a train, and yet, existing safety rules do not put them there.

Mr. GLICKMAN. What do you mean internal, in the middle of a train?

Mr. PIKARSKY. That is correct. I understand, and I am not talking with a great deal of competence in this area, that either they are not generally placed right behind the locomotive or at the tail end of a train. Again, I am not talking with a great deal of competence.

Mr. GLICKMAN. Do you believe the Federal Railroad Administration and their safety inspectors have been performing an adequate service in guaranteeing a safe rail operation?

Mr. PIKARSKY. Again, I believe that it is a proper Federal responsibility. I am not personally competent to respond as to how adequate they cover that area.

Mr. GLICKMAN. Any questions?

Mr. TEEL. I have one question.

Regarding the safety area, you indicated a need for greater work in the emergency reaction to accidents. It seems to be a problem and not just on this mode of transport. Not too long ago in this town we had a couple of examples where we were not well prepared to handle some serious accidents.

It seems we are always reacting to problems rather than planning ahead for them.

I guess my question is what do you propose to be done in this area? Or do we have to wait for more catastrophies to occur before we prepare for them?

Mr. PIKARSKY. The question really is that attempting to respond to potential incidents causes us to use our past experience and designate a specific set of responses.

There is a feeling in the Federal emergency management areas and others that we should be developing the relationships with the responsive groups in case of an incident; who should be in charge, who should be getting together to respond in these areas; how do you involve those institutions that should be there rather than a specific response.

This is a matter which is in need of a great deal of additional attention, rather than promulgating specifics as to who gets called first and what happens thereafter.

Mr. TEEL. Let me followup.

Do you feel the FRA in this particular area, in their safety program, is adequately addressing the problem?

Mr. PIKARSKY. As far as the specifics, more needs to be done. I think the FRA recognizes that. I presume that this is something that Administrator Blanchette and others would pursue in greater depth were they being given that mandate.

Mr. GLICKMAN. Thank you both, gentlemen. We appreciate your testimony.

Mr. GLICKMAN. Our final witness today is Mr. John Dwyer, vice president and general manager of the Locomotive Marketing Division, General Electric.

Mr. Dwyer, thank you for testifying.

STATEMENT OF JOHN C. DWYER, VICE PRESIDENT AND GENERAL MANAGER, LOCOMOTIVE MARKETING DIVISION, TRANSPORTATION SYSTEMS BUSINESS OPERATION, GENERAL ELECTRIC CO., ACCOMPANIED BY JOSEPH TAMPICO, GE

Mr. DWYER. Thank you, Mr. Chairman.

I am John C. Dwyer. I am a vice president of the General Electric Co. and general manager of the Locomotive Marketing Division. With me is Dr. Joseph Tampico from my staff.

We manufacture diesel electric and straight electric locomotives at our plant in Erie, Pa. for domestic railroads and for export to railroads throughout the world where trade barriers do not preclude our market participation. We are the free world's second largest locomotive builder.

I appreciate the opportunity of appearing before this committee to offer comments on rail technology and the future of U.S. railroads.

U.S. railroads are the world's most efficient, by most any applicable measuring stick. They generate more than twice the revenue ton miles per mile of route as any country in Western Europe and over 2½ times that of Japan.

Similarly, U.S. railroads move this traffic with one-fourth to one-tenth the number of employees per route mile of any of the developed countries of the free world.

Further, in an era of concern over productivity, the Nation's active fleet of road locomotives increased its output from 44.6 million revenue ton miles per locomotive unit in 1978 to 51.8 million revenue ton miles per unit in 1981, an average productivity improvement in excess of 5 percent per year.

My point in relating the statistics above is, that world leadership in the movement of freight traffic by rail is firmly based in the United States and the technology is continuing to advance through the efforts of the American railroads and their supply industry.

As further evidence of this technological leadership, at least in the area of locomotive technology, over 80 percent of the locomotives supplied to lesser developed countries of the free world have been U.S. designs.

While the U.S. railroad and related manufacturing industries are pre-eminent in world technology in the movement of goods, the principal thrust of these hearings seems to be directed at rail passenger service.

Certainly this interest is not surprising in view of the considerable publicity that has been given to the so-called "bullet trains" operated on the Tokaido line between Tokyo and Osaka in Japan and more recently the TGV or Tres Grande Vitesse train operating from Paris to Lyon in France.

Before commenting on high-speed passenger service in the United States I would first like to make some observations concerning these two operations offshore, to put them in what I believe is their proper perspective.

Actually, there are two Tokaido lines and there are significant differences between them that I think are best illustrated by this simple chart. (Figure 1.)

The wavy line represents the old Tokaido line while the straighter line portrays the new one.

The older line is depicted in this manner because it more closely follows the natural terrain where minimum excavation is required to minimize gradients.

Operating trains at speeds of, say, 150 miles per hour on the old profile would defy the laws of physics unless the curves were banked like a bobsled run, which would, of course, cause slower trains to overturn.

Hence, having decided on the need for a high-speed passenger service from Tokyo to Osaka a new, very straight and level route was built and a number of mountains leveled in the process.

A second difference between the two lines is that the old one carries both freight and local passenger service, while the new one is exclusively for limited stop passenger express service.

It is worthwhile noting that while approximately five times as many trains operate on the old route, the cost of maintaining the track and roadbed on the high-speed line is seven times higher directly as a result of the speed of operation.

Another most significant difference between the two lines is that there are no grade crossings on the high-speed line.

There are other notable characteristics of the high-speed line in Japan. It was built and equipped completely by Japanese contractors and manufacturers, not because of any technological superiority that they possess, but, rather, as a result of a national policy under which no foreign firms may compete for business on the Japanese National Railways.

Second, the distance from Tokyo to Osaka is 320 miles or approximately the same distance as from Washington, D.C. to New Haven, Conn.

In fact, to put this in proper perspective as shown on this chart, (Figure 2), the entire principal island of Japan fits very neatly into a portion of the northeast corner of the United States. These dimensions are critical to the subject of your hearing.

Another critical dimension, by the way, is that the Japanese National Railways employs 29.2 workers per route mile versus the 2.6 on the railroads of the United States.

Based on employment costs in the U.S., this single expense approximates the Nation's entire intercity freight bill in 1980. Faced with these costs, it is unlikely our rail system would survive.

The same basic characteristics apply to the high-speed service in France. The route is completely grade separated, the right-of-way is relatively straight, it will be segregated completely for passenger service and, again, it was built and equipped completely by French manufacturers, since foreign firms by national policy are not permitted to bid for work on the SNCF.

Mr. GLICKMAN. You mean the French Government or French National Railroad has a specification that they will not allow American suppliers, contractors, to build this system?

Mr. DWYER. Yes; that is correct.

I can show you copies of the International Journal of Commerce in which calls for bids are made in which those statements are made. They are public documents.

Mr. **Glickman**. I find it incredible that we financed about a quarter billion dollars worth of that project. Yet, we—our investors, our people—were not able to build any part of it.

Mr. **Dwyer**. Yes; that is correct.

Mr. **Glickman**. That is phenomenal.

Proceed.

Mr. **Dwyer**. For the geographic comparison on the French project, as distinguished from the Japanese, the distance from Paris to Lyon is approximately 260 miles, about the same as from New York to Washington, or in this case let's say from Dallas to Houston since—as shown on this chart—(Figure 3) the entire country of France fits very neatly into the State of Texas.

The numbers are similarly staggering on relative efficiency with 11.0 workers per route mile on the French National Railways versus the 2.6 in the United States.

My reason for equating the distances between the Japanese and French cities to the Boston to Washington corridor is because of the existence of a rail passenger corridor in that portion of the United States.

I had the opportunity to ride on the final acceptance run of the first Metroliner placed inservice in the Northeast Corridor in 1969.

The test runs were made on a special, relatively straight section of track of the then Penn Central route between Trenton and New Brunswick, N.J. On that run we attained a top speed of 167 miles per hour, or nearly 270 kilometers per hour.

At this point, I would like to urge everyone to read press releases closely and distinguish between English and metric units since 167 miles per hour is the same speed as nearly 270 kilometers per hour.

The absolutely essential point here is that there are no technological secrets possessed by railroad operators and equipment manufacturers in other parts of the world relating to making a train run fast and safe.

It is fundamentally a question of establishing the need, the objective, the economics and defining the parameters. The technology is well and widely known within U.S. industry.

Train operation at speeds of 150–160 miles per hour requires such drive system components as fully suspended traction motors to reduce unsprung weight. This design concept is supplied by U.S. manufacturers for commuter and transit cars, and can be supplied, if required, for locomotives as well.

Existing U.S. traction motor technology is entirely suitable for high-speed service as well.

Traction motor horsepower will be determined by running time requirements, vehicle weight and the choice between locomotive hauled or multiple unit trains, and, again, the technology is well-known.

In the field of power conditioning for the drive system, there can be a choice between electro-mechanical and various forms of thyristor control.

U.S. industry has supplied all types, and most recently General Electric has received an award for production quantities of an advanced design phase controlled thyristor locomotive from Mexican National Railways against worldwide competition.

For current collection, work has already been done on the aerodynamic requirements of pantographs at these speeds which showed existing hardware is totally satisfactory.

The most critical item required for continued high-speed operation is the track, where, again, new technology is not required. The barrier here is economic, not technical.

Track for 150 miles per hour operation is not only initially expensive, but as shown in other countries, the cost of maintaining alignment and track conditions that permit 150 miles per hour is extremely expensive.

Since we are possessed of the technological capability of designing, building, and furnishing both the trains and civil construction needed for high-speed rail passenger transportation in the United States, what else is needed?

First of all, we cannot do anything about the size of the United States. It is fixed. The distance between major metropolitan areas is enormous by comparison with those found in, for example, France and Japan.

It is always going to be 713 miles between New York and Chicago as the crow flies, and it is always going to be 2,451 miles from New York to Los Angeles, and, of course, the Rocky Mountains are there to stay.

Because of the size of the country and the inherent nature of our economic infrastructure, rail freight transportation is a keystone of our productive system and essential to the growth of the economy.

It is readily apparent that the impact of running mixed freight and passenger traffic on the same right-of-way seriously impairs the efficacy of both.

In addition, should an attempt be made to utilize existing rail rights-of-way for high-speed passenger service, the route configuration would present the same problems which the Japanese faced when they opted to build a complete new line.

Highway grade crossings would have to be eliminated lest the term "bullet train" take on a totally new connotation.

We have a Nation full of people who are accustomed to freight trains moving on railroads at speeds up to 70 miles per hour. For high-speed service at speeds of 150 miles per hour, grade crossing elimination would be imperative. The last grade crossing project on the Long Island Railroad ran in excess of $29 million.

The number of grade crossing eliminations for this service is obviously unknown but there are approximately 400,000 highway grade crossings in the United States.

Faced with all of these factors, we would probably do as the Japanese did and opt to construct a new line—provided we still felt the economic and/or social need for high-speed intercity passenger service.

Given the enormous expense associated with construction of a grade separated, exclusive right-of-way over the long distances prevailing in the United States, economic justification must be based on usage.

Usage is largely a function of population density and the most densely populated corridor in the United States, estimated at 115,000 persons per route mile between New York and Boston, is only approximately three-quarters of the estimated 150,000 persons per route mile in the Tokaido district of Japan.

No other corridor in the United States begins to approach this density and travel between other city pairs would have to be explored before a judgment could be made on the economic justification of the high-speed rail link between them, and economic justification based on the cost of a new line for the reasons outlined above.

It may belabor the obvious, but 270 kilometers per hour train equipment does not provide a three-hour trip from New York to Chicago. Two hundred and seventy kilometers per hour is 150 miles per hour, the route is not "as the crow flies," political considerations would certainly dictate stops within political subdivisions, both State and municipal and, finally, there is still a union work rule on railroads, initiated by the Federal Government when they operated the railroads in World War I, providing that 100 miles of operation is a days work for the train crew.

That means a stop every 24 minutes at 160 miles per hour.

In summary, we can say that America's freight hauling railroads lead the world in technology and are continuing to develop new technologies to continue their path of being an effective modal competitor and contributing to the economic growth of the country.

With regard to high-speed rail passenger transportation, the efficiency of the Nation's current railroad system should not be compromised with the passenger transportation burden and that the issue of high-speed rail passenger transportation on its own grade separated, protected right-of-way is an economic and social one, not a technological one. The technology is here in the United States.

Thank you.

[The prepared statement, with attachments, of Mr. Dwyer follows:]

TESTIMONY BY
MR. JOHN C. DWYER
VICE PRESIDENT GENERAL ELECTRIC CO.
BEFORE
SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.
APRIL 5, 1982

My name is John C. Dwyer. I am a Vice President of the General Electric Company and General Manager of the Locomotive Marketing Division. We manufacture diesel electric and straight electric locomotives at our plant in Erie, Pennsylvania for domestic railroads and for export to railroads throughout the world where trade barriers do not preclude our market participation. We are the free world's second largest locomotive builder. I appreciate the opportunity of appearing before this committee to offer comments on rail technology and the future of U.S. railroads.

U.S. railroads are the world's most efficient, by most any applicable measuring stick. They generate more than twice the revenue ton miles per mile of route as any country in western Europe and over two and one-half times that of Japan. Similarly U.S. railroads move this traffic with one-fourth to one-tenth the number of employees per route mile of any of the developed countries of the free world.

Further, in an era of concern over productivity, the nation's active fleet of road locomotives increased its output from 44.6 million revenue ton miles per locomotive unit in 1978 to 51.8 million revenue ton miles per unit in 1981, an average productivity improvement in excess of 5% per year. We, at General Electric, feel we have contributed to this performance with locomotives of increasing reliability, availability, horsepower and pulling power. Since 1978, we also have improved the fuel efficiency of G.E. locomotives delivered to American railroads by an average of 12.5%.

My point in relating the statistics above is that world leadership in the movement of freight traffic by rail is firmly based in the United States and the technology is continuing to advance through the efforts of the American railroads and their supply industry. As further evidence of this technological leadership, at least in the area of locomotive technology, over 80% of the locomotives supplied to lesser developed countries of the free world have been U.S. designs.

While the United States railroad and related manufacturing industries are preeminent in world technology in the movement of goods, the principal thrust of these hearings seems to be directed at rail passenger service. Certainly this interest is not surprising in view of the considerable publicity that has been given to the so-called "bullet trains" operated on the Tokaido line between Tokyo and Osaka in Japan and more recently the TGV or Tres Grande Vitesse train operating from Paris to Lyon in France.

Before commenting on high speed passenger service in the United States I would first like to make some observations concerning these two operations offshore.

Actually, there are two Tokaido lines and there are significant differences between them that I think are best illustrated by this simple chart. (Fig. 1) The wavy line represents the old Tokaido line while the straighter line portrays the new one. The older line is depicted in this manner because it more closely follows the natural terrain where minimum excavation is required to minimize gradients. Operating trains at speeds of say 150 miles per hour on the old profile would defy the laws of physics unless the curves were banked like a bobsled run, which would of course cause slower trains to overturn. Hence, having decided on the need for a high speed passenger service from Tokyo to Osaka a new, very straight and level route was built and a number of mountains leveled in the process.

A second difference between the two lines is that the old one carries both freight and local passenger service, while the new one is exclusively for limited stop passenger express service. It is worthwhile noting that while approximately five times as many trains operate on the old route the cost of maintaining the track and road bed on the high speed line is seven times higher directly as a result of the speed of operation.

Another most significant difference between the two lines is that there are no grade crossings on the high speed line.

There are some other notable characteristics of the high speed line. It was built and equipped completely by Japanese contractors and manufacturers, not because of any technological superiority that they possess, but rather as a result of a national policy under which no foreign firms may compete for business on the Japanese National Railways.

Secondly, the distance from Tokyo to Osaka is 320 miles or approximately the same distance as from Washington, D.C. to New Haven, Conn. In fact, to put this in proper perspective as shown on this chart, (Fig. 2), the entire principal island of Japan fits very neatly into a portion of the northeast corner of the United States. These dimensions are critical to the subject of your hearing.

Another critical dimension, by the way, is that the Japanese National Railways employs 29.2 workers per route mile versus the 2.6 on the railroads of the United States. Based on employment costs in the U.S., this single expense approximates the nation's entire intercity freight bill in 1980. Faced with these costs, it is unlikely our rail system would survive.

The same basic characteristics apply to the high speed service in France. The route is completely grade separated, the right of way is relatively straight, it will be segregated completely for passenger service and again, it was built and equipped completely by French manufacturers, since foreign firms by national policy are not permitted to bid for work on the SNCF.

For the geographic comparison the distance from Paris to Lyon is approximately 260 miles, about the same as from New York to Washington, or in this case let's say from Dallas to Houston since as shown on this chart (Fig. 3) the entire country of France fits very neatly into the State of Texas. The numbers are similarly staggering on relative efficiency with 11.0 workers per route mile on the French National Railways versus the 2.6 in the United States.

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In the field of power conditioning for the drive system, there can be a choice between electro-mechanical and various forms of thyristor control. U.S. industry has supplied all types, and most recently General Electric has received an award for production quantities of an advanced design phase controlled thyristor locomotive from Mexican National Railways against worldwide competition.

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Since we are possessed of the technological capability of designing, building and furnishing both the trains and civil construction needed for high speed rail passenger transportation in the United States, what else is needed? First of all, we cannot do anything about the size of the United States. It is fixed. The distance between major metropolitan areas is enormous by comparison with those found in, for example, France and Japan. It is always going to be 713 miles between New York and Chicago as the crow flies, and it is always going to be 2451 miles from New York to Los Angeles, and of course, the Rocky Mountains are there to stay.

Because of the size of the country and the inherent nature of our economic infrastructure, rail freight transportation is a keystone of our productive system and essential to the growth of the economy. It is readily apparent that the impact of running mixed freight and passenger traffic on the same right of way seriously impairs the efficacy of both. In addition should an attempt be made to utilize existing rail rights of way for high speed passenger service the route configuration would present the same problems which the Japanese faced when they opted to build a complete new line. Highway grade crossings would have to be eliminated lest the term "bullet train" takes on a new connotation.

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Faced with all of these factors, we would probably do as the Japanese did and opt to construct a new line - provided we still felt the economic and/or social need for high speed intercity passenger service.

Given the enormous expense associated with construction of a grade separated, exclusive right of way over the long distances prevailing in the United States, economic justification must be based on usage. Usage is largely a function of population density and the most densely populated corridor in the United States, estimated at 115, 000 persons per route mile between New York and Boston, is only approximately three-quarters of the estimated 150,000 persons per route mile in the Tokaido district of Japan. No other corridor in the United States begins to approach this density and travel between other city pairs would have to be explored before a judgment could be made on the economic justification of the high speed rail link between them, and economic justification based on the cost of a new line for the reasons outlined above.

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In summary, we can say that America's freight hauling railroads lead the world in technology and are continuing to develop new technologies to continue their path of being an effective modal competitor and contributing to the economic growth of the country. With regard to high speed rail passenger transportation, the efficiency of the nation's current railroad system should not be compromised with the passenger transportation burden and that the issue of high speed rail passenger transportation on its own grade separated, protected right of way is an economic and social one not a technological one. The technology is here in the United States.

Thank you.

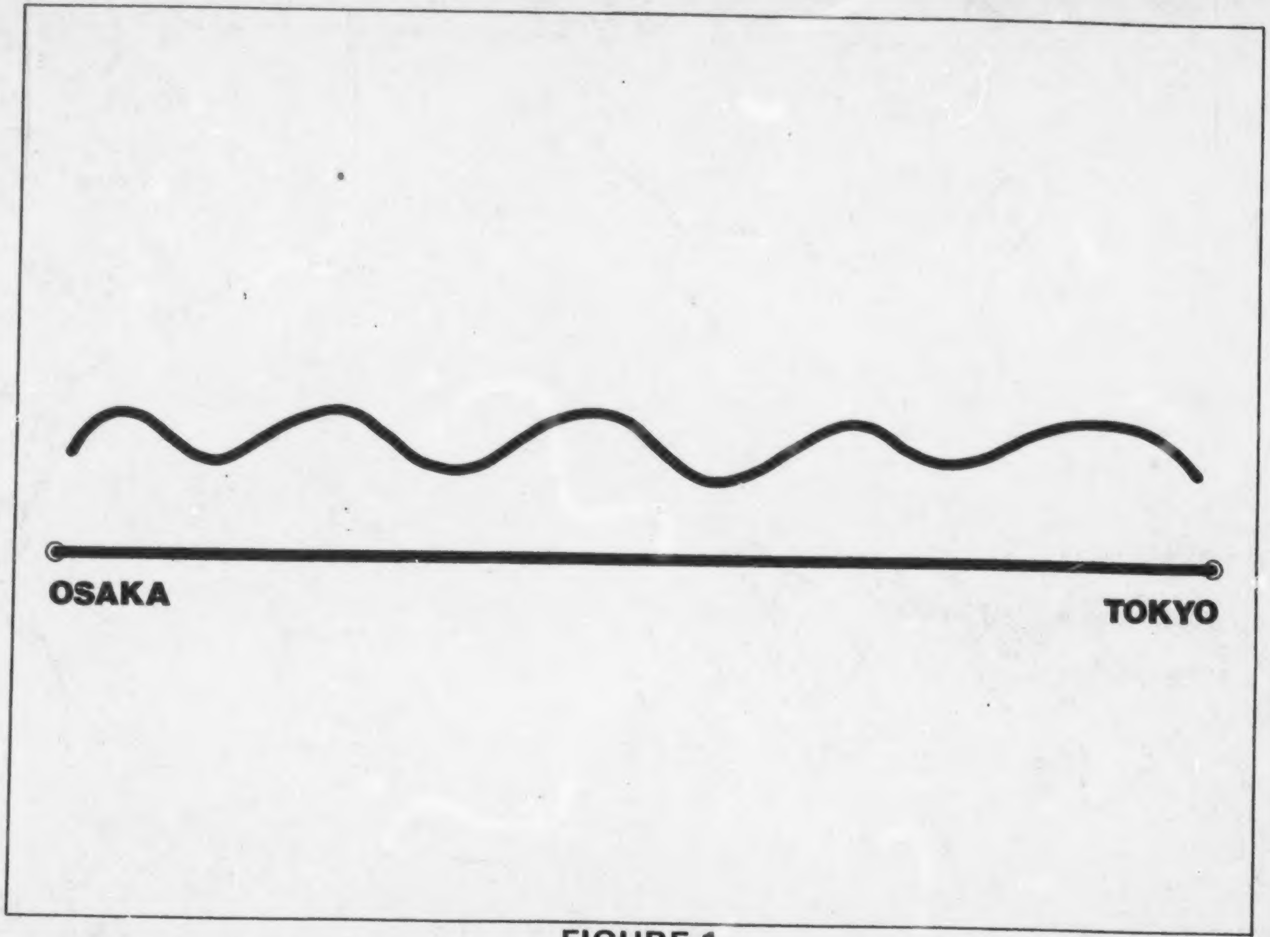


FIGURE 1

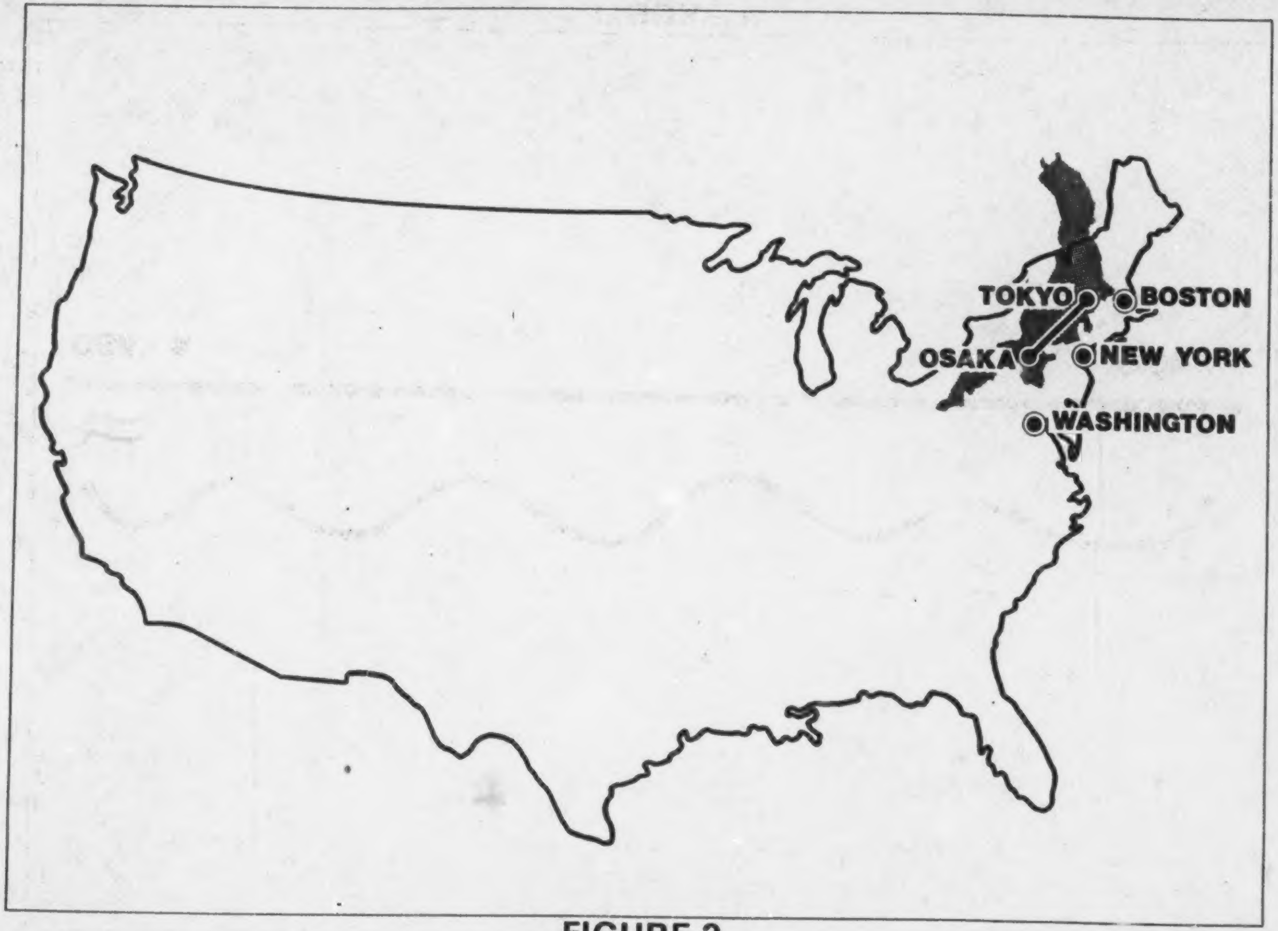


FIGURE 2

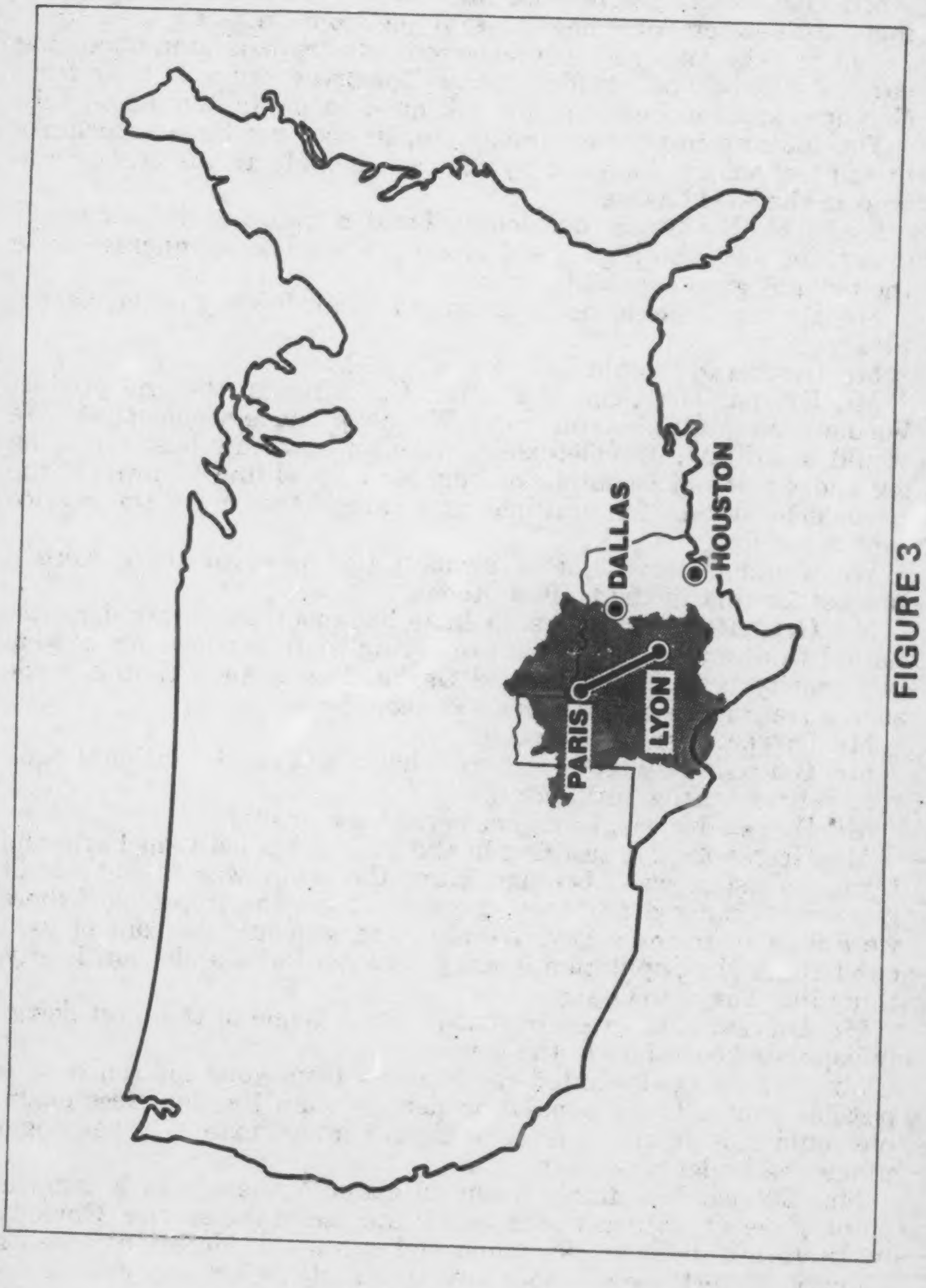


FIGURE 3

Mr. GLICKMAN. Thank you, Mr. Dwyer, for that excellent and thoughtful statement. I have several questions for you.

You are the only representative of industry, the manufacturing part of it, who has testified today. Tomorrow we will hear from Northrop and the Budd Co. We will have people talking about this.

You indicate in your testimony, Japan does not have superiority in rail technology. I assume by that you include all the other countries in the world as well.

If the United States decided to build a bullet train system or something like the high-speed system, what U.S. companies have the technological capability to build it?

Mr. DWYER. I would not presume to speak for any other companies.

Mr. GLICKMAN. Would GE?

Mr. DWYER. The General Electric Co. is not in the end product business on multiple unit cars. We do produce locomotives. We would be willing, provided there were an economic base for doing so, and we would certainly be capable and willing to provide the propulsion system for multiple unit cars if that were the service type opted for.

We would expect a lot of competition, provided there were a market for that in the United States.

Mr. GLICKMAN. You talked a little bit about passenger densities here. I think by inference you are saying there is enormous passenger density between Tokyo and Osaka. It was such that it made such a train more valid in terms of economics?

Mr. DWYER. Just by the usage.

Mr. GLICKMAN. Were you here when the French National Railroad representative testified?

Mr. DWYER. No, sir; I was not here this morning.

Mr. GLICKMAN. He testified in the TGV train between Paris and Lyon, its usage was also signficant, the train was filled. I don't know how many a day they operated. I got the impression there were 8 or 10 trains a day. We have the schedule in front of us. I don't think the population density between Paris and Lyon is anything like Tokyo to Osaka.

Mr. DWYER. It is lower, obviously. That is one of the most densely populated corridors in the world.

Mr. GLICKMAN. I wanted to get away from your inference. It is possible that a lower population density than the Japanese example could still justify at least passenger usage, extensive passenger usage of a bullet-type train.

Mr. DWYER. We didn't mean to connote there was a magical point of density which would justify the use of the service. Obviously, there are different economic and social considerations in each country. Nevertheless, before any—certainly before any private operator short of Government funding would invest in a high-speed rail service from city A to city B, I think he would have a considerable amount of work done, origin and destination studies and what patronage could be expected for the ridership.

Mr. GLICKMAN. I don't know what the statistics are for the Metroliner. I do know it was originally envisioned as a relatively high-speed train.

Mr. DWYER. Yes, sir.

Mr. **Glickman**. It still makes that run in about 3 hours. But I don't think their top speed is over 100 miles an hour.

Mr. **Dwyer**. I believe it is currently 120 miles an hour.

Mr. **Glickman**. Where does it run 120 miles per hour for any distance?

Mr. **Dwyer**. Any place it can attain those speeds with track restrictions in the corridor. That, of course, is a mixed service between freight and passenger. Actually, the cars were geared down when it was decided to reduce the speed of operation.

Mr. **Glickman**. Do you think it is economically feasible to establish dedicated high-speed passenger rail corridors in highly populated routes of 100 to 400 miles?

Mr. **Dwyer**. It would depend upon the projection of the ridership for the system. Basically, we have found in this country even in the areas of local transportation that it is not self-sustaining.

Mr. **Glickman**. There has to be some subsidy?

Mr. **Dwyer**. I happen to be a vice chairman of a local transit authority in Erie, Pa. As any other public transit system in the United States, it is not self-supporting.

Mr. **Glickman**. I do think it is important to point out that whereas my prejudices would probably lead me to like to see one of these systems go, I agree with you. I think we are blind to the realities if we think all public transportation can be totally self-sustaining.

I think it is very difficult for public transportation to be self-sustaining. I think we have to assume that risk when we go into that situation.

Mr. **Dwyer**. I believe that is absolutely correct.

Mr. **Glickman**. There may be public purposes to be served. There may be economic purposes irrespective.

Mr. **Dwyer**. Our principal message that I tried to bring here is that really there is not a technological barrier to providing the service that is the subject of your committee hearing. It is simply a decision as to whether or not it is in the best interests of this country in meeting social needs of the people to provide that service, recognizing, as you point out, it would undoubtedly require significant public funding.

But there is no technological barrier to achieving that once that decision is made.

Mr. **Glickman**. In your testimony, you state that the efficiency of the Nation's current railroad system should not be compromised with the passenger transportation burden.

How would high-speed rail service compromise the efficiency of the U.S. rail system?

Mr. **Dwyer**. I am speculating as to the specifics, but certainly the ability of a railroad to compete effectively with other modes of transport in the movement of freight would be impaired if priority were given on that railroad to the movement of passenger service as distinct from the freight service.

If the freight train has to stop while the bullet train goes by, obviously their ability to compete for freight transportation would be impaired.

Mr. **Glickman**. Would the New York to Washington corridor be the highest population density for the purposes of one of these trains?

Mr. **Dwyer**. In the United States; yes, sir. It would, definitely, by far.

Mr. **Glickman**. As a representative of the private sector, what do you consider as the proper Federal role in both rail R & D and in capital investments?

Mr. **Dwyer**. I believe, as far as the research and development is concerned, that—I agree with Administrator Blanchette, whose remarks I heard earlier—safety is an area that should be researched to the public sphere. That, I believe, should be the extent of Federal involvement in the area of research and development.

I think private industry is fully capable and is continuing to do that research as far as the existing freight transportation system on the U.S. rails. You can argue that there is not much research being done on high-speed rail passenger service and simply it is the car and the horse.

If there is a demand for that service, it can be provided by U.S. industry.

Mr. **Glickman**. I would like to go back to a situation that troubles me very much. I guess a statement was made. I assume it ought to be subject to confirmation about the fact that we were not able to bid on any portion of the French high-speed system.

Mr. **Dwyer**. Yes, sir.

Mr. **Glickman**. Is that also applicable in other areas? Was that a specification of the French national railroad system? Is that something you face in other things?

Mr. **Dwyer**. We supply locomotives, as I mentioned, on a worldwide basis. They are to those countries of the world that do not have their own manufacturing infrastructure.

The developed countries of the world, to say nothing of behind the Iron Curtain, but the developed countries of the world who have their own industry, without exception, limit participation in the supply of equipment to that industry to domestic manufacturers.

Mr. **Glickman**. How about Japan?

Mr. **Dwyer**. That is true in Japan.

Mr. **Glickman**. So, to your knowledge, was there any American participation in the development of the bullet train either in equipment or——

Mr. **Dwyer**. No, sir. We have a volume here which is the announcement of the initiation of the Tokaido line. In fact, there are 17 pages on the description of the line itself which, incidentally, that sort of portrays what the grade separation is like. This is on stilts the whole distance and quite straight. This much describes the line and this much describes the manufacturers; and this statement exists, if I can just lay my finger on it right here, that:

> This is a testimony to Japanese industry. The miraculous development of the Japanese economy made it possible. The new Tokaido line is a product of this glorious development of Japanese industry which now ranks fourth in the world.
>
> In short, the success of the Tokaido line may be said to be a victory for Japanese industry.

Mr. **Glickman**. It may be a victory for Japanese industry. I am not sure what indirect help our Government or citizens provided.

Whether we decide to pursue it or not is our own business, but the fact that we are excluded from participating overseas when we encourage it in this country is absolutely incredible. I am one of the most active opponents of trade restrictions and have been because I come from an agricultural State. It works both ways. I worry.

Mr. **Dwyer**. Mr. Chairman, the General Electric Co. is an extremely strong supporter of free, fair world trade. To be fair, free trade has to be bilateral. We would be perfectly delighted to have the Japanese, the French, or any other country participate in competition with us for business in this country, in furnishing railroad equipment, provided we are able to compete with them in their home market.

Mr. **Glickman**. Tomorrow we will have the senior vice president of engineering of the Japanese National Railways here.

I intend to pursue this line of questioning with him.

I guess what really disturbs me is that Morgan Stanley was able to sell $250 million worth of bonds in this country to finance the railroad system that American industry couldn't participate in.

I find that just terribly inconsistent at the very least.

We thank you.

Steve, any questions?

Mr. **Teel**. You gave some numbers comparing the number of workers required to maintain the rails.

Mr. **Dwyer**. Total employees; not just on the maintenance of the rail.

Mr. **Teel**. A factor of 4 and a factor of 10 for both the Japanese and the French, respectively. Is that all attributable to high speed or are they just less productive than we are?

Mr. **Dwyer**. That is not attributable to high speed. I used those statistics as an expression to support a statement of the U.S. railroads being the most efficient rail operators in the world.

Mr. **Glickman**. Is this perhaps a social decision on their part in terms of how they employ people in Japan?

Mr. **Dwyer**. I really can't answer that. Certainly a portion of it would be the existence of a much larger percentage of the total as passenger service in those countries than as freight service which apparently require more people.

Certainly these high-speed operations, although that is a small percentage of the total, it is just one line—that does require an extremely large number of people and heavy expense for maintenance of the track to permit those continued high speeds.

Certainly some of it may be just to make employment. I don't know. Those are just measures of the relative efficiency of U.S. railroads versus those in the rest of the world.

Mr. **Glickman**. We thank you for your testimony.

That concludes the testimony for today. Tomorrow we will have the testimony of Congressman Benjamin, chairman of the Appropriations Subcommittee on Transportation, and others, including representatives of Amtrak, the Japanese National Railways, and other organizations. The testimony tomorrow will be at 9:30 a.m.

The hearing is adjourned for the day.

[Whereupon, at 3:05 p.m., the subcommittee recessed, to reconvene at 9:30 a.m., Tuesday, April 6, 1982.]

ADVANCED RAIL TECHNOLOGY

TUESDAY, APRIL 6, 1982

House of Representatives,
Committee on Science and Technology,
Subcommittee on Transportation, Aviation and Materials,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:35 a.m., in room 2325, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee), presiding.

Mr. Glickman. The hearing will come to order.

This is the second day of our subcommittee hearings on the issue of the future of American railroads, particularly as influenced by rail technology.

Looking at the crowd, it was mentioned to me that if we could get this many people to ride the trains we would have real healthy economy in America.

In any event, I am delighted that we are having these hearings now and I am particularly delighted at our first witness today, our colleague from the State of Indiana, Adam Benjamin, who chairs the Transportation Subcommittee of the Appropriations Committee. He is probably the most knowledgeable Member of Congress on transportation issues.

Adam is a member, and I think the founding member, of the American side of the Japanese-American Rail Congress. He has been active on a variety of transportation issues, particularly railroads.

Yesterday we heard from a variety of witnesses including Congressman Reuss and members of the French National Railroad regarding a French TGV.

I am going to deviate from the schedule later, and allow the gentleman from the French National Railroad to testify after Dr. Takahashi, because after the close of hearings yesterday he felt that there may be some misconceptions as a result of some of the testimony at the end of the day. And so I am going to allow him to come back again to speak for a few minutes.

It is a pleasure to commend our colleague from Indiana, Congressman Benjamin. I am delighted that you are here. Adam, you may proceed as you wish.

STATEMENT OF HON. ADAM BENJAMIN, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF INDIANA

Mr. Benjamin. Thank you, Chairman Glickman.

Mr. Chairman, honored guests:

I am delighted and privileged to join the Subcommittee on Transportation, Aviation and Materials as it studies and evaluates the future of American transportation with emphasis on advanced rail technology.

I commend Chairman Dan Glickman on his work to improve the technology and system of transportation in America, particularly with focus on the major projected development of the 1980's: high speed rail.

Today's witnesses will concentrate their expertise on high speed rail technology.

For instance, you will hear the Honorable Dr. Koji Takahashi, senior vice president and member of the board of directors of the Japanese National Railways this morning.

Dr. Takahashi has served with the JNR for 37 years. He was a part of the original design and concept team which successfully built the original Shinkansen or bullet-train line.

It was Dr. Takahashi who convinced the JNR to determine the feasibility of the Shinkansen. What is little known is that he personally walked the 340-mile route of the Shinkansen during its conception to determine the precise nature of the terrain over which the train would run.

His presence with us today illustrates the interest and commitment of the JNR to help improve passenger rail service in the United States.

The testimony of our honored guest from Japan will undoubtedly be helpful to the subcommittee's deliberations.

I am convinced of the economical and technical feasibility as well as the necessity of establishing high speed rail service in the United States. With your understanding, I will confine my observations to conditions which signal a resurgence of national passenger rail travel.

The developments in American rail travel have not paralleled other industrialized nations since the end of World War II.

The railroad, as a mode of passenger intercity travel, dropped steadily from 20,000 daily trains to less than a 20,000-mile system.

An infusion of Federal funds and interest into the Northeast Corridor, Amtrak and local commuter service abated the decline, rallied ridership and projected a litany of emerging corridors which may, for the most part, become the high speed corridors of tomorrow.

Passenger rail service, excluding commuter travel, is almost exclusively handled by Amtrak which recently observed increased passenger demand on many routes with improved equipment and on-time performance.

Rail passenger importance has been influenced by:

One, questions on unrestrained use of the automobile raised by price instability and availability of oil products.

Two, size reduction and mission modification of the family automobile making it a city car more than a vehicle for long-distance trips.

Three, natural limits on the ability of bus companies to expand their markets.

Four, painful awareness that crumbling highways are less safe and more fuel demanding.

Five, chaotic air travel conditions aggravated by sharply rising operating costs, overly restrictive air traffic control, and deregulation inviting a passenger shift to surface transport modes.

In its November report entitled "Case Studies in Private/Public Cooperation to Revitalize America", the Joint Economic Committee found that:

> . . . One part of the answer in meeting the Nation's future transportation needs would be the establishment of a balanced transportation system: a system which capitalizes on the benefits of every mode of transportation, rather than extending the use of one or two modes into areas where they are not the most efficient or economical.
>
> An important component of a balanced transportation system, and one part of the solution in meeting future transportation demands, is a viable rail system, including passenger operations.

The concept of a balanced approach to the Nation's transportation system is crucial. It has become increasingly evident that the Nation's highways, airways, and waterways are not capable of being exclusive transportation modes.

The United States is too vast, too diverse, and too dynamic to accept a sole mode. Each has its advantages and disadvantages, its exclusivity and its competitiveness.

Railways dominate intercity transportation travel in Japan and Europe. There, government planned systems include financed or supported railroads which prevented any significant deterioration of rail travel.

Demographic and land-use characteristics keyed to rail's competitive position in other countries include:

One, densely developed urban areas located in 100–300-mile corridors.

Two, highly developed public transportation providing good access to rail stations.

Three, low automobile availability and high air travel costs.

These characteristics are also found in certain population corridors in the United States. While it may not be feasible to have a bullet train, flying peacock or mag-lev train in every population corridor, a balanced system and the mix of passenger transport should be encouraged and determined by the predominant demographic, cost, and technological needs of the geographical area.

The development of intercity passenger technology in the United States has been basically sporadic.

The history of development of rail passenger technology in Japan and Europe has been quite different. Ongoing research and development programs, supported by the national railroads, have continually upgraded and improved technology.

About the same time that the Congress persuaded Presidents Kennedy and Johnson that train service should be restored in the Northeast Corridor, Japan decided to develop high speed rail.

By mid-1959, it tested rail at speeds of 163 kilometers per hour. By 1962, its tests were at 256 kilometers per hour.

By the end of 1964, the bullet train was operational as an environment efficient, environmentally protective, safe, and profitable alternative to highways and airways.

Today, the bullet train is 663 miles long. One-third of the route is tunnels and one-tenth is overwater bridges. It has carried more than 1.800 billion passengers without a fatality. The Shinkansen line, with 275 daily trains, is inspected daily by instrumented inspection trains and walking track inspectors.

The line is closed every evening to allow replacement of worn or defective rails, rail grinding, ballast tamping, tightening of rail connections, and other maintenance.

France entered a new era on September 27 when its new TGV began service on the new Paris to Lyon track. The train operates at 160 miles per hour.

France is now planning a second high speed electric line from Paris to connect with existing trackage to western and southwestern France.

The British have developed the Advanced Passenger train which runs curves at 125 miles per hour and reaches 160 miles per hour in tests.

Although some operating problems exist, the train can operate on conventional track with tight curves at high speeds.

Australia is about to enter regular service with its new Express Passenger train, a high performance, self-contained diesel-electric intercity express passenger service.

The Budd Co. has developed an ultra-high-speed passenger system in which vehicles are magnetically levitated, guided, and propelled along an elevated guideway at speeds of more than 250 miles per hour.

The mag-lev system is described as flying at ground level with a propulsion system which has no moving parts to cause vibration. The mag-lev system dispenses with the conventional steel wheels on steel rails concept and operates free from traditional railway limitations.

In fact, the 1975 Improved Passenger Train Service Conference at Carnegie-Mellon University concluded that it was then time to implement the technological developments.

Five years later at the same university, the First Rail Systems Technology and Operations Symposium sponsored by the Federal Railroad Administration concluded that:

> Foreign technology has shown the way toward high speed passenger services. These capabilities can be made available in the United States at considerable cost and, with a high level of personal dedication on the part of the Government, the operators, the designers and the public.

IPEEP, otherwise known as the improved passenger equipment evaluation program, the 1977 sequel to IPT, otherwise known as the improved passenger train, conducted detailed systematic evaluations of advance trains and equipment in operation or development throughout the world.

Its conclusion:

> The eighties offer a great future and challenge to rail passenger service if we heed the work of others, move slowly but deliberately, and do not attempt to overstep reality.

Population corridors in which frequent, reasonably fast and efficient train service could economically compete with air and automobile travel were identified in the 1981 joint Amtrak, FRA, and DOT report.

Unfortunately, the future of emerging corridor development became clouded in 1981 debates on Amtrak's budget needs. A projected 1983 Federal budget deficit as high as $180 billion with unprecedented high interest rates and an economic recession have further inhibited Federal transportation policy.

As a consequence, today's shift to examine private financing of only several high density, highly populated transportation corridors in lieu of the Federal interest in the late 1970's.

This is not to conclude that the Federal Government should be excluded in the future for possible assistance, whether financial, technical, credit assurance, or right-of-way.

The Japan Railway Technical Service has provided funds to study the feasibility of bullet train operations in the Los Angeles-San Diego and Miami-Tampa corridors. The preliminary assessment favors profitability and the potential attraction of private investment.

Several Amtrak officials have helped from the American High Speed Rail Corp., to seek private financing for the Los Angeles-San Diego route.

The new company will seek about $2 billion with 25 percent of that sum expected from Japanese sources. After financing is arranged, 5 years will be required to build the railway.

Congress is on record in support of high speed rail. Besides the expired 1965 High Speed Ground Transportation Act, the 1981 Transportation Appropriations Act provided $4 million for marketing studies for emerging corridors; $150,000 of that is being used with 50 percent matching State funds to study the Las Vegas-Los Angeles corridor; $250,000 has been matched by the State of Michigan for a study of the Chicago-Detroit corridor.

Congressman Henry Reuss, the personable and visionary cochairman of the Joint Economic Committee, introduced the Rail Passenger Service Act of 1981 last June.

The bill encourages the creation of high speed rail systems equal to or better than those of other industrialized nations.

The first meeting of the Japan-United States Rail Congress was held in Washington last November. A 17-member delegation of Japanese Diet members met with American counterparts, including the distinguished gentleman from Kansas who chairs this subcommittee, to discuss trade and technology transfers between the two countries.

The committee report of Public Law 97-102 (1982 Transportation Appropriations Act) stated support of the Japan-United States Rail Congress and found that high speed train services in other countries demonstrated that high speed rail could be financially self-supporting. The conferees also concluded that adequate private capital was available.

The report further directed the Department of Transportation and the Federal Railroad Administration to prepare a report to the Congress on the creation of an American high speed rail passenger system.

The FRA and Amtrak were specifically directed to determine the feasibility of high speed corridors between Los Angeles-San Diego, Orlando-Miami, Chicago-Detroit, Chicago-Milwaukee, and Chicago-Cincinnati via Indianapolis.

I am convinced that existing economic and technology conditions, as well as serious congressional interest, signal the threshold of a new rail passenger era in the United States—predicted on intercity high speed corridors and automated rapid intracity transit.

In 1909, Robert H. Goddard, subsequently recognized by the Congress as the father of rocketry, wrote an English theme entitled "Traveling in 1950."

In that paper, Goddard proclaimed that midtwentieth-century travelers would go from Boston to New York in 10 minutes at an average speed of 1,200 miles per hour by way of a supertrain propelled by electromagnetic force within a steel vacuum tube.

Mr. Chairman, the era of the supertrains is upon us. Hopefully, the wisdom, vision, and discussion of subcommittees such as yours will recognize the era and capture its significance to assure the most basic right of every American: the right to be mobile with the guarantees of safety, economy, and comfort.

In conclusion, even high speed rail development will be sporadic and inconclusive as a viable travel mode unless the Reuss bill or comparable legislation becomes law. Several of the positive reflections of your 2 days of hearings should be incorporated into any congressional enactment.

This Nation has spent more than $25 billion in the past two decades to save a national rail passenger skeleton and freight service east of the Mississippi. While billions have been expended for other travel modes as well as rail deferred maintenance subsidies, acquisition of bankrupt railroad stock and the delineation of a Northeast Corridor, only $56 million has been dedicated to high speed rail.

Mr. Chairman, this Congress must speak for the Nation and meet its needs. High speed rail is a very definitive need. We don't need dreamers anymore—we need builders—to rebuild the Nation's infrastructure and revitalize its industrial base—all of which is dependent on transportation which is accessible, economical, comfortable, reliable, safe, and fast—that is high speed rail—a dream that can come true with the help of yourself and your subcommittee.

Thank you very much, Mr. Chairman.

Mr. GLICKMAN. Thank you, Adam, for that excellent statement. Many of your thoughts parallel what we heard yesterday. One of the things that we heard yesterday from most of the witnesses was that we really don't need major advances in technology to move ahead with high speed rail, that most of the technological advances have already been made or are of the type that would not require us to wait for years.

Would you agree with that statement?

Mr. BENJAMIN. I definitely would, Mr. Chairman.

Mr. GLICKMAN. The other thing is that in your statement you indicated that your subcommittee report and the transportation bill directed the DOT and FRA to report to Congress on the creation of a high speed rail system.

Are they in the process of doing that now?

Mr. BENJAMIN. We trust that they are, Mr. Chairman. We will expect that before we mark up this bill for this year.

Mr. BENJAMIN. Good, because we would like to see that also.

The final thing I would ask you is in your conference report you indicated that adequate private capital was available.

What do you think the Federal role is going to be in high speed rail in at least the next 5 years?

Mr. **Benjamin**. The initial role has to be one of encouragement and that is the stage that we are presently at. However, I would not rule out the fact that we may have to provide right-of-way. We may have to provide some assurances of availability of credit. We may have to, in certain instances, provide even testing sites for the equipment and the technology as it is employed in the United States.

Basically, we are going to have to husband this operation because I don't think it will exist by itself.

Our Nation has been too reliant on the freight system over the passenger system because of other modes of travel. To get us back into a balance structure and that is what we are looking at, we are going to have to provide leadership at this level and that is the Congress of the United States.

Mr. **Glickman**. It was stated yesterday that we are not looking for the Federal Government to necessarily provide loan guarantees or the kinds of things we provided in the Synthetic Fuels Corporation, but what we want to know is that the Federal Government is interested in this being a high priority issue, then the private capital will flow knowing that the Federal Government believes it is high priority.

Would you agree with that basic statement?

Mr. **Benjamin**. I would definitely agree with that.

Mr. **Glickman**. Well, Adam, we thank you for your testimony very much and to the extent that you would care to or your staff would care to, we would invite you or them to stay with us during the rest of this hearing.

Mr. **Benjamin**. Thank you, Mr. Chairman. I will stay with you as long as I can.

Mr. **Glickman**. Very good. Thank you.

Mr. **Glickman**. We are pleased to have as our next witness Hon. Dr. Koji Takahashi. Dr. Takahashi is senior vice president of engineering, Japanese National Railways.

I had the honor of meeting Dr. Takahashi yesterday. As Congressman Benjamin mentioned, Dr. Takahashi has been with the Japanese National Railways for many years and spearheaded the development of the bullet train. We are delighted to have him here and would look forward now to his testimony.

Thank you very much for coming today.

STATEMENT OF DR. KOJI TAKAHASHI, SENIOR VICE PRESIDENT-ENGINEERING, JAPANESE NATIONAL RAILWAYS

Dr. **Takahashi**. Mr. Chairman, honorable members of this committee, distinguished guests, ladies and gentlemen, I am both honored and grateful to have this opportunity to testify before this committee on the subject of Japanese National Railways' high speed passenger rail system, its Shinkansen.

May I also add that I am delighted to do so in this room surrounded by such colorful reminders of America's great technical achievements in space exploration. Everywhere in Japan we were watching the progress of the Columbia last week and I offer my congratulations on another successful flight.

As stated in your kind introduction, I am currently the chief engineer and the senior vice president of Japanese National Railways, and as such am responsible for all types of rail service.

In an earlier stage of my career—some 25 years ago in 1957 until 1964—I was totally dedicated to high speed passenger rail systems as I was a part of the team that designed and built the original Tokaido Shinkansen that links Tokyo and Osaka.

When Japanese National Railways was faced with the problem of providing additional service on the Tokaido route, JNR was the predominant force in land transportation in Japan with operations covering 13,000 miles of narrow gage track—and operating at a profit.

At the same time, the United States and several European countries with standard gage railroads had express trains capable of providing service at speeds of 90 to 100 miles per hour, but the growing number of private automobiles, the developing highway systems, and the expanding airline networks were already beginning to deplete these railroads' share of the intercity passenger markets.

This was not true in Japan where the passenger rail market was still expanding and where the fastest express trains could only run at 60 miles per hour, sometimes taking close to 8 hours to cover the 340 miles between the 2 major cities of Tokyo and Osaka.

Consequently, the primary concern of JNR's Railway Technical Research Institute was in speeding up rail service.

Experiments had already been going on in all aspects of high speed operation, the term high speed indicating speeds of over 130 miles per hour.

Heated debates raged over materials and designs for high speed running and the attendant problems, such as snake motion, wheel and track, power collection, and train control.

The debate eventually led to the determination that it would be possible to run a high speed, standard gage train between Tokyo and Osaka at speeds of 130 miles per hour. With this decision came a vague outline of the system we know today as the Shinkansen.

The then president of JNR, Mr. Shinji Sogo, picked up on this idea and secretly ordered me to conduct a feasibility study. A man of great vision and even greater determination, Mr. Sogo managed to convince the Government to fulfill what had become his dream. He arranged for a loan of $80 million from the World Bank and construction got underway in 1959.

In October 1964, 5½ years later, the Tokaido Shinkansen went into service. Part way through construction, a 23-mile-long section of actual track was opened for testing.

Trials at increasingly higher speeds tested the performance of the tracks, the catenaries, and the rolling stock in actual running conditions.

In 1963, when the test train reached its record speed of 159 miles per hour, I became very excited and it seemed to me that this high speed train would revolutionize ground transportation.

The increase in ridership in the Tokyo-Osaka corridor for 1970—after 5 years of operation—was more than 1½ times our optimistic estimate. The actual daily ridership grew by 300 percent in those first 5 years.

Now, what has caused this huge increase in traffic volume? The high frequency of service and the very convenient reservation system have, no doubt, contributed.

But, I believe, the greatest cause lies in the accident free and highly punctual service offered, which has become all the more evident as the years went by.

In 17 years of actual service, the Shinkansen has carried 1.7 billion passengers without a single accident or passenger injury—a safety record unmatched in the transportation field.

The careful coordination of Shinkansen planning with local urban development plans has led to its great convenience with stations spaced to gather from potential markets, yet not making too many time-consuming and speed-reducing stops.

Even though the siting of the station in downtown areas increases construction cost, it has been so done with our Shinkansen for good connection with feeder services, especially our conventional lines

Then, what is the secret of the Shinkansen's unparalleled safety record and on-time performance? I believe it lies in the combination of the following five characteristics:

First, that all aspects of the system—tracks, rolling stock, catenaries, et cetera—were newly designed so as to fit into a total system, and that all were built or manufactured under strict quality control;

Second, that the possibility of human error has been reduced as much as possible. All trains are protected by the Automatic Train Control system and their routes and operation are controlled by the Centralized Traffic Control system;

Third, that the tracks and catenaries are regularly inspected by the multipurpose inspection train and are maintained accordingly;

Fourth, that detection equipment is placed throughout the system to warn of natural hazards such as high winds and earthquakes for controlling the train's progress through the affected area; and

Last, that dual systems and standby units are used for vital equipment. For instance, the 16-car train is made up of eight 2-car units, and even if power in one unit should fail, the train can still maintain on-time performance.

The safety and dependabilty, in addition to the speed and convenience, of this system have drawn passengers in huge numbers and that means a large income.

In fact, the Shinkansen is the star moneymaker with an income of $3.17 billion as opposed to expenditures of $1.87 billion, yielding an operating ratio of 59 percent.

Personnel expense accounts for less than a quarter of the total expenses, while it is over one-half for JNR as a whole, indicating that the entire system—in and of itself—has one of the characteristics of a finely tuned machine.

The success of the Shinkansen has not contributed only to the coffers of JNR. It has made significant contributions to the economic and social development of the regions it runs through.

During the construction period, more jobs were created, not only in the construction work, but in the related industries, such as cement and steel.

It has led to an increase in the overall economic activity of the areas along its route, thereby helping to balance economic development throughout Japan.

In essence, the construction of the Shinkansen was the creation of a national resource. In metaphorical terms, it was the mining of a superhard metal with which we refurbished our economic and social infrastructure, providing an element that increases the productivity of our industries.

The Shinkansen has also aided the Japanese economy through its energy efficiency. The per-passenger energy consumption of the Shinkansen is only about 20 percent of that of airplanes or private cars. This is a major consideration for a country that must import every drop of oil it uses.

This year JNR is inaugurating service on two Shinkansen extensions—one between Omiya on the outskirts of Tokyo and Morioka in the north, and the other between Omiya and Niigata in the northwest.

We expect to complete the section between Tokyo and Omiya before 1986. We are also planning extensions linking Morioka and points further north and linking Tokyo and Osaka via the Japan Sea route.

During the 17 years of Shinkansen operation, the average travelling distance per passenger has hovered around 200 miles. That and the fact that the Shinkansen has been able to capture at least 80 percent of the passenger market between Tokyo and Osaka, 320 miles apart, has led us to believe that our Shinkansen is competitive with other modes of transportation in medium length or 100- to 500-mile intercity corridors.

In order to improve the Shinkansen's time/speed factor to make it more competitive over longer distances, we are constantly improving our system.

In test runs in 1972 we achieved a speed of 176 miles per hour with our Shinkansen train set and then reached 198 miles per hour in a 1979 test run with improved equipment which will be used on the northbound extensions.

However, based on our assumption that 200 miles per hour is the practical limit for rail/wheel contact trains, we have been developing a faster train that does not rely on rail/wheel contact.

The superspeed mag-lev or magnetically levitated vehicle set a new land speed record of 323 miles per hour on its 4.6 mile test track in December, 1979.

JNR places strong emphasis on research and has constantly been working to improve not only the speed of its trains, but also their safety, dependability, and comfort.

Since Japan is a country of geological and meteorological extremes, we have been researching more effective technical measures and operating procedures to deal with the problems of heavy rains and snowfalls, high winds, and earthquakes.

At the same time, we are working hard to reduce the unpleasant environmental effects of train operation on our neighbors in densely populated areas.

Trains are not operated in a vacuum; therefore, the economic considerations are but one aspect of managing a railroad.

I would like to finish my testimony by stressing this point. The successful planning and management of a railroad is a synthesis of far-reaching and long-term social and technical considerations, such as urban planning and environment policy.

This synthesis can only be achieved through constructive and active debate and the careful weighing of all elements. This is not easy, but it is not impossible. The achievements represented by the pictures in this very room are proof to me that the United States has the spirit and the vitality necessary to plan and manage what could be the world's best high speed passenger railway.

Thank you for your kind attention. I would be happy to answer any questions you may have after this brief film about Shinkansen.

Mr. GLICKMAN. Why don't we hit the lights so we can show the film.

I might say to the people at the door, there are some more seats. Before we start showing the film, there are some seats over at the side.

[Film shown.]

Mr. GLICKMAN. We want to thank you very much, Dr. Takahashi, not only for your statement, but also for the film which I think brings to our attention a feel for high-speed rail that you cannot just see from testimony. Hopefully some of us will be able to come to Japan this summer and ride the train, if possible.

I would like to ask you a few questions, and then I am going to ask Mr. Benjamin. I see we have been joined by Mr. Goldwater from California, who represents part of the Los Angeles area.

In your assessments of the U.S. market, what corridors or what part of this country do you feel would be economically suitable for a Shinkansen-type high-speed system?

[Dr. Takahashi responded in Japanese; his remarks were interpeted into English by Mrs. Gregg.]

Dr. TAKAHASHI. I feel that the high-speed Shinkansen type transportation is most suitable for areas with rather dense populations and between two cities situated some 200 to 300 miles or even 400 miles apart.

Mr. GLICKMAN. I am going to skip around to a variety of different types of questions now, because I have many to ask. Yesterday we discussed the operating costs of Shinkansen. What percentage of the operating costs of the Shinkansen are due to personnel, to labor costs?

Dr. TAKAHASHI. If you would kindly refer to this material at your hand, and turn to page 6, you will see a diagram. As you can see in that diagram 24.9 percent of the total operation cost is used for personnel costs.

Mr. GLICKMAN. Your statement indicated the Shinkansen operates at a profit; is that correct?

Dr. TAKAHASHI. Also if you would kindly refer to diagram 7 on page 6 of the same reference material, you will see that it shows 3,169 units of revenue. The units are in millions of dollars, so the revenue is $3.169 billion. Next to that you can see expenses also indicated in millions of dollars, $1.871 billion for expenses. So it is run at a profit. There is a graph on the left of that diagram that shows the annual operating ratio of Shinkansen over the last several years.

Mr. **GLICKMAN**. Does the entire Japanese National Railroad operate at a profit?

Dr. **TAKAHASHI**. J.N.R. operated at a profit until 1965. Since then the Shinkansen and major metropolitan commuter trains, both public and private, have operated at a profit. Overall, however, JNR operates at a deficit.

Mr. **GLICKMAN**. Does the Japanese Government make up that deficit?

Dr. **TAKAHASHI**. The Japanese Government does not make up the deficit every year. We manage the deficit with loans. But every several years the Japanese Government does pitch in and help us to reduce our deficits.

Mr. **GLICKMAN**. OK. I just have a couple more questions, and then I am going to ask Dr. Benjamin and Mr. Goldwater.

How many dollars does the Japanese National Railways spend on research every year?

Dr. **TAKAHASHI**. We have earmarked at the present time approximately $50 million for the research activities of JNR's Railway Technical Research Institute, but besides the research at the institute, we do have some additional research going on outside the institute.

Mr. **GLICKMAN**. You mean outside of JNR in some other areas?

Dr. **TAKAHASHI**. No, sir; we have several other research projects going on within the JNR, even though it is outside the JNR Railway Technology Research Institute.

Mr. **GLICKMAN**. I must tell you first of all, your statement that after 17 years of service, the Shinkansen has carried 1.7 billion passengers without a single accident or passenger injury is one of the most incredible statistics I have ever seen. I wonder if you might comment generally on how you were able to assure such a remarkable safety record.

Dr. **TAKAHASHI**. First of all, we have a totally new dedicated track with new roadbed and viaducts between Tokyo and Osaka. Then we used welded rails so that the rails are a single, continuous piece of metal. This rail is manufactured under very stringent quality control, so there have been no accidents or derailments due to the equipment failure or physical defects in materials. And also with respect to our accident record, if you would kindly turn to page 16 of the reference material, you will see Nos. 3 and 4 which refer to our accident—free performance.

The second factor in securing safe train operation, is that the train speed is continuously and automatically controlled by the ATC, automatic train control. At the present, we have 10 trains per hour in each direction and these are controlled by the ATC system.

Mr. **GLICKMAN**. Mr. Benjamin.

Mr. **BENJAMIN**. Thank you, Chairman Glickman.

Dr. Takahashi, you have indicated that the commuter service in the high-speed rail system operated by the Japanese National Railways does operate at a profit as compared to the total system, which does not. We have not been able to operate our commuter service in the United States at a profit. What makes you think that we could operate high-speed rail at a profit, and this should be of particular concern, since I assume that you will be a shareholder at least in the initial venture?

Dr. **Takahashi**. First of all, I would like to say I am no expert on American transportation, but I feel that you could build a transportation system that would operate at a profit if you fulfilled the following conditions: If before building the system, you chose the least costly construction methods, then if you build a system that is as mechanized or automated as possible, and you must make a system that can be operated at the least possible cost. It is possible to operate both commuter transportation systems and high-speed transportation systems at a profit.

Mr. **Benjamin**. Dr. Takahashi, the first two studies that are being conducted in cooperation with Americans are in the Los Angeles to San Diego corridor, and the Orlando to Miami corridor, which are corridors that we consider in our Sun belt. Is there any reluctance to place the operation of the Japanese high-speed rail train in a colder climate such as the Midwest part of our Nation?

Dr. **Takahashi**. I think you can recall some of the snowy scenes in the movie we have just shown. We have developed techniques for operating high-speed trains safely in snowy areas if the snow accumulation is not too great. So I would not hesitate at all to construct a high-speed transportation system in the Midwest area where you would have some snowfalls.

Mr. **Benjamin**. Thank you very much Mr. Chairman, and thank you, Dr. Takahashi, for your response.

Mr. **Glickman**. Thank you, Mr. Benjamin.

Mr. Goldwater.

Mr. **Goldwater**. Dr. Takahashi, the Japanese National Railroad system, is that a government corporation or is that a privately owned enterprise?

Dr. **Takahashi**. The Japanese National Railway is a public corporation, which means the assets and the financial matters ultimately are in the hands of the Government. But day-to-day operation and management are completely left in the hands of the Japanese National Railways. The JNR budget is submitted to the Japanese Diet for approval.

Mr. **Goldwater**. Are there some advantages to having the JNR owned by the Government that would not accrue to an ownership that is entirely private?

Dr. **Takahashi**. As I stated before, the JNR is a national governmental corporation. If you are going to embark on the new construction of the new transportation from the angle of the construction cost, and if the construction cost is going to be a huge amount, it might be better to have a public corporation. But if you are going to look at it only from the efficient management, then private corporation may be the answer.

Mr. **Goldwater**. When you built this high-speed corridor, this rail system, one of the most expensive aspects of that is acquiring rights-of-way. Was there something unique about the Government's relationship that reduced the costs of acquiring the initial right-of-way that normally, through dense populated areas is extremely expensive, and when you amortize that over the life of the system, adds to the unprofitability of a rail system?

Dr. **Takahashi.** I think it is a misconception to think that because JNR is a public corporation it was easier to acquire the right-of-way. In fact, I think the situation in Japan is very different. The fact that we are a public corporation made it much more difficult to obtain or acquire the right-of-way. Ultimately the right-of-way acquisition is protected by the law of the eminent domain and as a final resort we could use that law to acquire the right-of-way. In acquiring the right-of-way for the northern Shinkansen route, between Tokyo and Morioka, we resorted to this law in only 1 out of 5,000 acquisition cases.

Mr. **Goldwater.** The question I would like to ask is, in the ticket fare, the farebox, is the full capital outlay recovered over a period of time, including the costs for purchasing the rights-of-way, and the costs of building the system? Is it all recovered?

Dr. **Takahashi.** If you would kindly also turn to page 5 of this reference material, there are figures for acquisition of right-of-way. Table 5 on page 5. And if you would look at the breakdown of the total costs, land acquisition is only part of them, and all these costs, which include land acquisition are, have been, or will be recovered by ticket fares. And in connection with the question of the recovery of land acquisition costs, on page 6, there is diagram 7, showing the percentage of capital costs of which the land acquisition costs are part.

Mr. **Goldwater.** It does not indicate on those charts what percentage of that revenue is made up by Government authorization and appropriations or Government contributions. And I guess in that regard, what percentage of the farebox would be looked upon as being subsidized?

Dr. **Takahashi.** With respect to high-speed rail, that is the Shinkansen alone, the Government provided a subsidy only during the construction period. The Government subsidized a part of the interest we had to pay on loans during the construction period. After the Shinkansen started operating, the Government ceased to subsidize the Shinkansen.

Mr. **Goldwater.** Could you say that for JNR, the total system?

Dr. **Takahashi.** The rule applied to the construction of the Shinkansen line applies to all other construction costs. But in the case of operating costs, the Government subsidizes 10 percent of our operational expenses.

Mr. **Goldwater.** For the total system?

Dr. **Takahashi.** Maybe I can express it this way: 10 percent of JNR's total revenues come from Government subsidies.

Mr. **Goldwater.** Ten percent of the operating revenue.

Dr. **Takahashi.** The Government has subsidized operating costs since 1965 in gradually larger amounts.

Mr. **Goldwater.** Mr. Chairman, I have no further questions, only to comment that I have had an opportunity to ride on the bullet train in Japan, and I was very impressed with how clean it is and efficient and on time, departure and arrival, and the overall operations. It was an exciting adventure to have that opportunity. I compliment the Japanese for their ingenuity.

Mr. **Glickman.** Thank you, Mr. Goldwater.

I just have one final question, magnetic levitation. When do you feel that magnetic levitation rail systems will be technologically feasible, and what are their primary technological problems? And how fast will you be able to go?

Dr. **Takahashi**. If you would again look at the material on page 20, it depicts the record of our experiences and experiments with magnetic levitation trains. In 1979, just as our research indicated, we attained a speed of 323 miles per hour. That was exactly the same result we predicted from our theories. We knew then that magnetic levitation is not a dream anymore, it is a fact, something which is actually going to be realized on a commercial basis. We are sure that magnetic levitation will be a future ground transportation mode providing service at over 300 miles per hour.

I would like to touch on another aspect of your question. We feel confident that we have solved all the technological problems of magnetic levitation as a transportation mode, but we are currently testing or doing research in the areas of safety, stability, dependability, and efficiency. That is what we are studying at this time. Another thing we are studying now is the design of more compact equipment for running this train. For these reasons, I think it will require a little bit more time before we can put that type of transportation system into regular commercial service.

Mr. **Glickman**. Do you have any estimates on when you will run your first commercially feasible magnetically levitated train?

Dr. **Takahashi**. Before the end of this year we are going to run the magnetic levitation train with actual passengers on it as a test run. After we get the results of these passenger-loaded test runs, we will have a better idea of when we can put it in service. We hope to have it running in Japan within 10 years.

Mr. **Glickman**. Do you have any estimates on operating costs of magnetic levitation versus conventional power?

Dr. **Takahashi**. Before we figure out how much operation costs will be, we have to think about how much it will cost to construct it. Due to the peculiar topographical conditions in Japan, our estimate for the construction cost of this particular mode of train will be 1.2 times the cost of constructing a high-speed Shinkansen train for the same route. Construction costs will be high in Japan, because of the necessity of building many tunnels and elevated bridges. The cost of the magnets would be relatively small in terms of the total costs.

In the United States, you would have lower construction costs due to the relatively flat topography. That means construction costs in comparison with those in Japan will be less. However, the relative cost of the magnets would be higher in terms of the total construction cost. And I think that will affect your operating costs. The cost of constructing a maglev system in the United States would probably be twice that of constructing a Shinkansen system here.

In addition to the construction costs, there will be high motive power costs because electrical costs increase in proportion to the speed. But since there would be no wheel-rail contact in order to run the maglev vehicle, maintenance and equipment costs would decrease. So, overall, the operating costs would probably be the same for magnetically levitated trains and Shinkansen type trains, because different factors would balance each other out.

Mr. **Glickman**. OK. We want to thank you very much, and we want to thank the people at the desk who helped you today. They did a very fine job. We will look forward to meeting and talking with you under the leadership of Congressman Benjamin, and we hope to continue our efforts to try to have dialog and meet with you on rail-related issues. We thank you for coming.

Dr. **Takahashi**. Thank you very much, Mr. Chairman.

[The prepared statement, plus attachments, of Dr. Takahashi follow:]

ADDRESS
BEFORE THE
UNITED STATES HOUSE OF REPRESENTATIVES
SCIENCE AND TECHNOLOGY COMMITTEE
AVIATION, TRANSPORTATION, AND MATERIALS SUBCOMMITTEE
BY
DR. KOJI TAKAHASHI
SENIOR VICE PRESIDENT -- ENGINEERING
JAPANESE NATIONAL RAILWAYS

Mr. Chairman, Honorable Members of this committee, Distinguished Guests, Ladies and Gentlemen:

I am both honored and grateful to have this opportunity to testify before this committee on the subject of Japanese National Railways' high speed passenger rail system, its Shinkansen.

As stated in your kind introduction, I am currently the Chief Engineer and the Senior Vice President of Japanese National Railways, and as such am responsible for all types of rail service. In an earlier stage of my career--some twenty-five years ago in 1957 until 1964-- I was totally dedicated to high speed passenger rail systems as I was a part of the team that designed and built the original Tokaido Shinkansen that links Tokyo and Osaka. When Japanese National Railways was faced with the problem of providing additional service on the Tokaido route, JNR was the predominant force in land transportation in Japan with operations covering 13,000 miles of narrow gauge track--and operating at a profit. At the same time, the United States and several European countries with standard gauge railroads had express trains capable of providing service at speeds of 90 to 100 miles per hour, but the growing number of private automobiles, the developing highway systems, and the expanding airline networks were already beginning to deplete these railroads' share of the inter-city passenger markets. This was not true in Japan where the passenger rail market was still expanding and where the fastest express trains could only run at 60 miles per hour, sometimes taking close to 8 hours to cover the 340 miles between the two major cities of Tokyo and Osaka.

Consequently, the major primary concern of JNR's Railway Technical Research Institute was in speeding-up rail service. Experiments had already been going on in all aspects of high speed operation, the term "high speed" indicating speeds of over 130 miles per hour. Heated debates raged over materials and designs for high speed running and the attendant problems, such as snake-motion, wheel and track, power collection, and train control. The debate eventually led to the determination that it would be possible to run a high speed, standard gage train between Tokyo and Osaka at speeds of 130 miles per hour. With this decision came a vague outline of the system we know today as the Shinkansen. The then President of JNR, Mr. Shinji Sogo, picked up on this idea and secretly ordered me to conduct a feasibility study. A man of great vision and even greater determination, Mr. Sogo managed to convince the government to fulfill what had become his dream. He arranged for a loan of 80 million dollars from the World Bank and construction got underway in 1959. Five and one-half years later in October 1964 the Tokaido Shinkansen went into service. Part way through construction, A 23 mile-long section of actual track was opened for testing. Trials at increasingly higher speeds tested the performance of the tracks, the catenaries, and the rolling stock in actual running conditions. In 1963, when the test train reached its record speed of 159 miles per hour, I became very excited and it seemed to me that this high speed train would revolutionize ground transportation.

The increase in ridership in the Tokyo-Osaka corridor for 1970--after 5 years of operation--was more than one and one-half times our optimistic estimate. The actual daily ridership grew by 300% in those first five years.

Now, what has caused this huge increase in traffic volume? The high frequency of service and the very convenient reservation system have no doubt contributed. But I believe the greatest cause lies in the accident-free and highly punctual service offered, which has become all the more evident as the years went by. In 17 years of actual service, the Shinkansen has carried 1.7 billion passengers without a single accident or passenger injury--a safety record unmatched in the transportation field.

The careful co-ordination of Shinkansen planning with local urban development plans has led to its great convenience with stations spaced to gather from potential markets, yet not making too many time-consuming and speed-reducing stops. Even though the siting of the station in downtown areas increases construction cost, it has been so done with our Shinkansen for good connection with feeder services, especially our conventional lines.

Then, what is the secret of the Shinkansen's unparalleled safety record and on-time performance? I believe it lies in the combination of the following five characteristics:

1st, that all aspects of the system--tracks, rolling stock, catenaries, et cetera--were newly designed so as to fit into a total system, and that all were built or manufactured under strict quality control;

2nd, that the possibility of human error has been reduced as much as possible. All trains are protected by the Automatic Train Control system and their routes and operation are controlled by the Centralized Traffic Control system;

3rd, that the tracks and catenaries are regularly inspected by the multipurpose inspection train and are maintained accordingly;

4th, that detection equipment is placed throughout the system to warn of natural hazards such as high winds and earthquakes for controlling the train's progress through the affected area; and

Lastly, that dual systems and standby units are used for vital equipment. For instance, the 16-car train is made up of eight 2-car units, and even if power in one unit should fail, the train can still maintain on-time performance.

The safety and dependability, in addition to the speed and convenience, of this system has drawn passengers in huge numbers and that means a large income. In fact, the Shinkansen is the star money-maker with an income of 3.17 billion dollars as opposed to expenditures of 1.87 billion dollars, yielding an operating ratio of 59%. Personnel expense accounts for less than a quarter of the total expenses, while it is over one half for JNR as a whole, indicating that the entire system--in and of itself--has one of the characteristics of a finely-tuned machine.

The success of the Shinkansen has not contributed only to the coffers of JNR. It has made significant contributions to the economic and social development of the regions it runs through. During the construction period, more jobs were created, not only in the construction work, but in the related industries, such as cement and steel. It has led to an increase in the overall economic activity of the areas along its route, thereby helping to balance economic development throughout Japan.

In essence, the construction of the Shinkansen was the creation of a national resource. In metaphorical terms, it was the mining of a super-hard metal with which we refurbished our economic and social infrastructure, providing an element that increases the productivity of our industries. The Shinkansen has also aided the Japanese economy through its energy-efficiency. The per-passenger energy consumption of the Shinkansen is only about 20% of that of airplanes or private cars. This is a major consideration for a country that must import every drop of oil it uses.

This year JNR is inaugurating service on two Shinkansen extensions--one between Omiya on the outskirts of Tokyo and Morioka in the north, and the other between Omiya and Niigata in the northwest. We expect to complete the section between Tokyo and Omiya before 1986. We are also planning extensions linking Morioka and points further north and linking Tokyo and Osaka via the Japan Sea route.

During the 17 years of Shinkansen operation, the average travelling distance per passenger has hovered around 200 miles. That and the fact that the Shinkansen has been able to capture at least 80% of the passenger market between Tokyo and Osaka, 320 miles apart, has led us to believe that our Shinkansen is competitive with other modes of transportation in medium-length or 100 to 500 mile inter-city corridors.

In order to improve the Shinkansen's time/speed factor to make it more competitive over longer distances, we are constantly improving our system. In test runs in 1972 we achieved a speed of 176 miles per hour with our Shinkansen train set and then reached 198 miles per hour in a 1979 test run with improved equipment which will be used on the north-bound extensions.

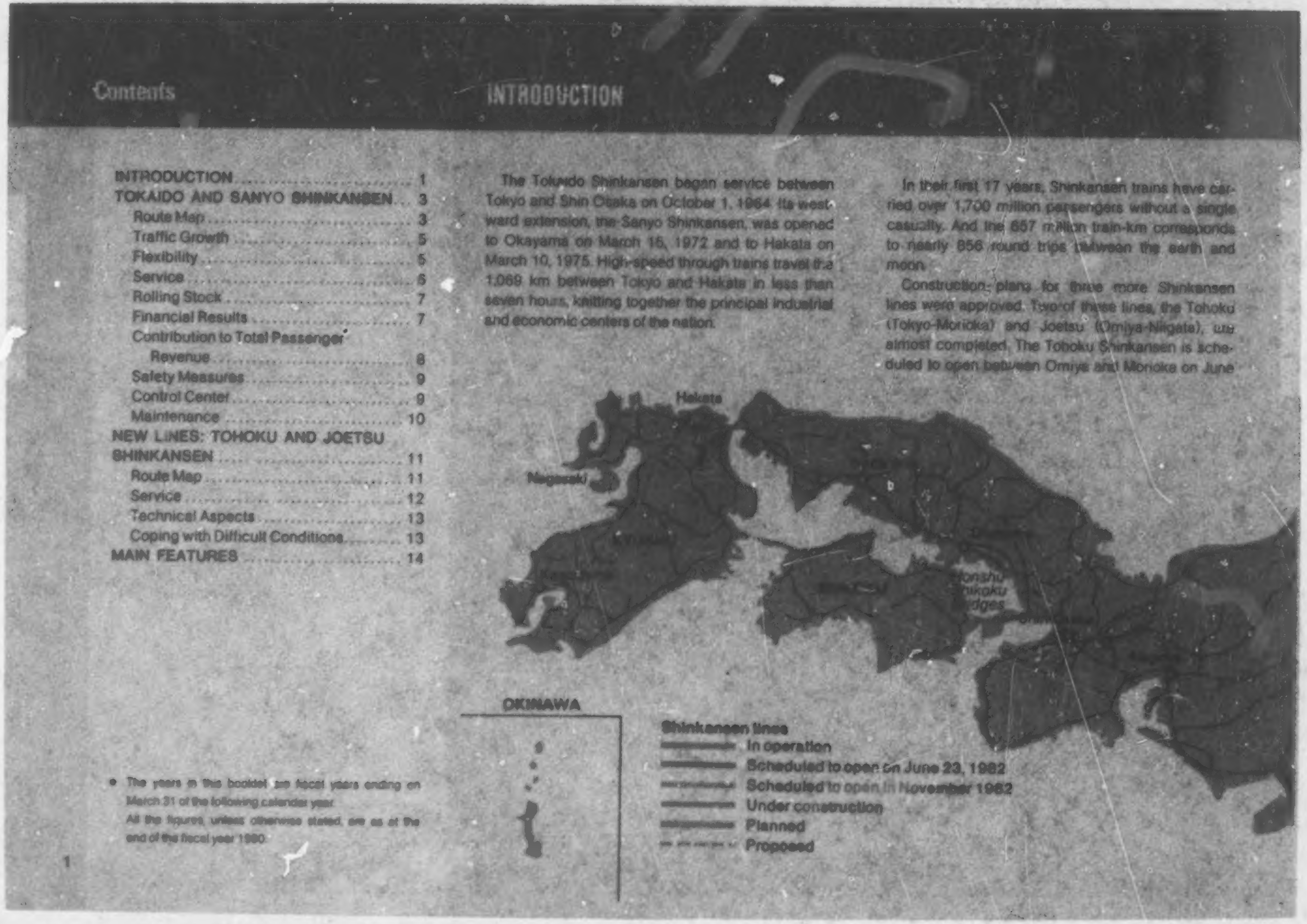
However, based on our assumption that 200 miles per hour is the practical limit for rail/wheel contact trains, we have been developing a faster train that does not rely on rail/wheel contact. The super-speed Maglev or magnetically levitated vehicle set a new land speed record of 323 miles per hour on its 7 kilometer test track in December 1979.

JNR places strong emphasis on research and has constantly been working to improve not only the speed of its trains, but also their safety, dependability, and comfort. Since Japan is a country of geological and meteorological extremes, we have been researching more effective technical measures and operating procedures to deal with the problems of heavy rains and snowfalls, high winds, and earthquakes. At the same time, we are working hard to reduce the unpleasant environmental effects of train operation on our neighbors in densely populated areas.

Trains are not operated in a vacuum; therefore, the economic considerations are but one aspect of managing a railroad. I would like to finish my testimony by stressing this point. The successful planning and management of a railroad is a synthesis of far-reaching and long-term social and technical considerations, such as urban planning and energy policy. This synthesis can only be achieved through constructive and active debate and the careful weighing of all elements. This is not easy, but it is not impossible. The achievements represented by the pictures in this very room are proof to me that the United States has the spirit and the vitality necessary to plan and manage what could be world's best high speed passenger railway.

Thank you for your kind attention,

SHINKANSEN



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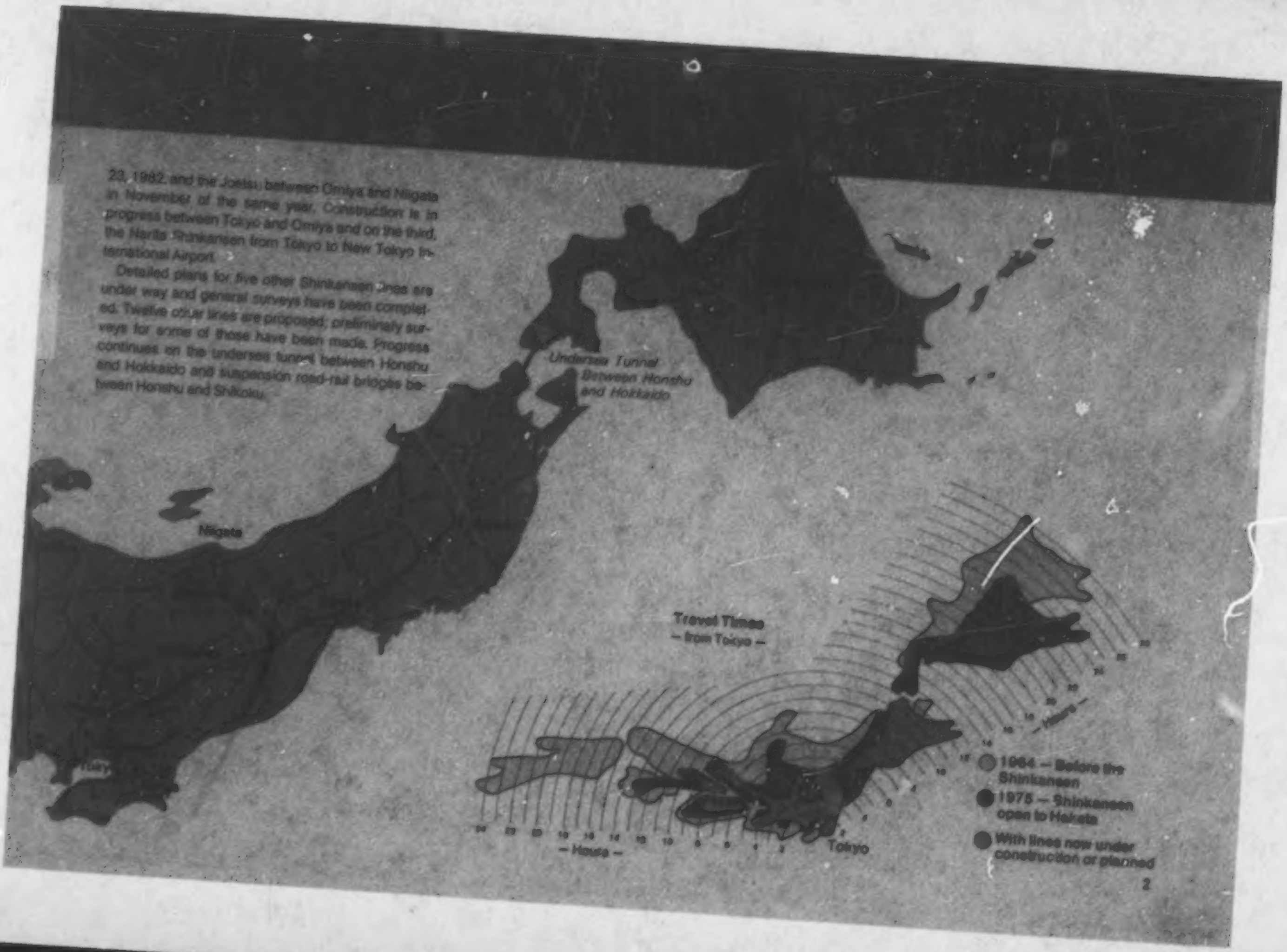
- The years in this booklet are fiscal years ending on March 31 of the following calendar year. All the figures, unless otherwise stated, are as at the end of the fiscal year 1980.

INTRODUCTION

The Tokaido Shinkansen began service between Tokyo and Shin Osaka on October 1, 1964. Its westward extension, the Sanyo Shinkansen, was opened to Okayama on March 15, 1972 and to Hakata on March 10, 1975. High-speed through trains travel the 1,069 km between Tokyo and Hakata in less than seven hours, knitting together the principal industrial and economic centers of the nation.

In their first 17 years, Shinkansen trains have carried over 1,700 million passengers without a single casualty. And the 657 million train-km corresponds to nearly 856 round trips between the earth and moon.

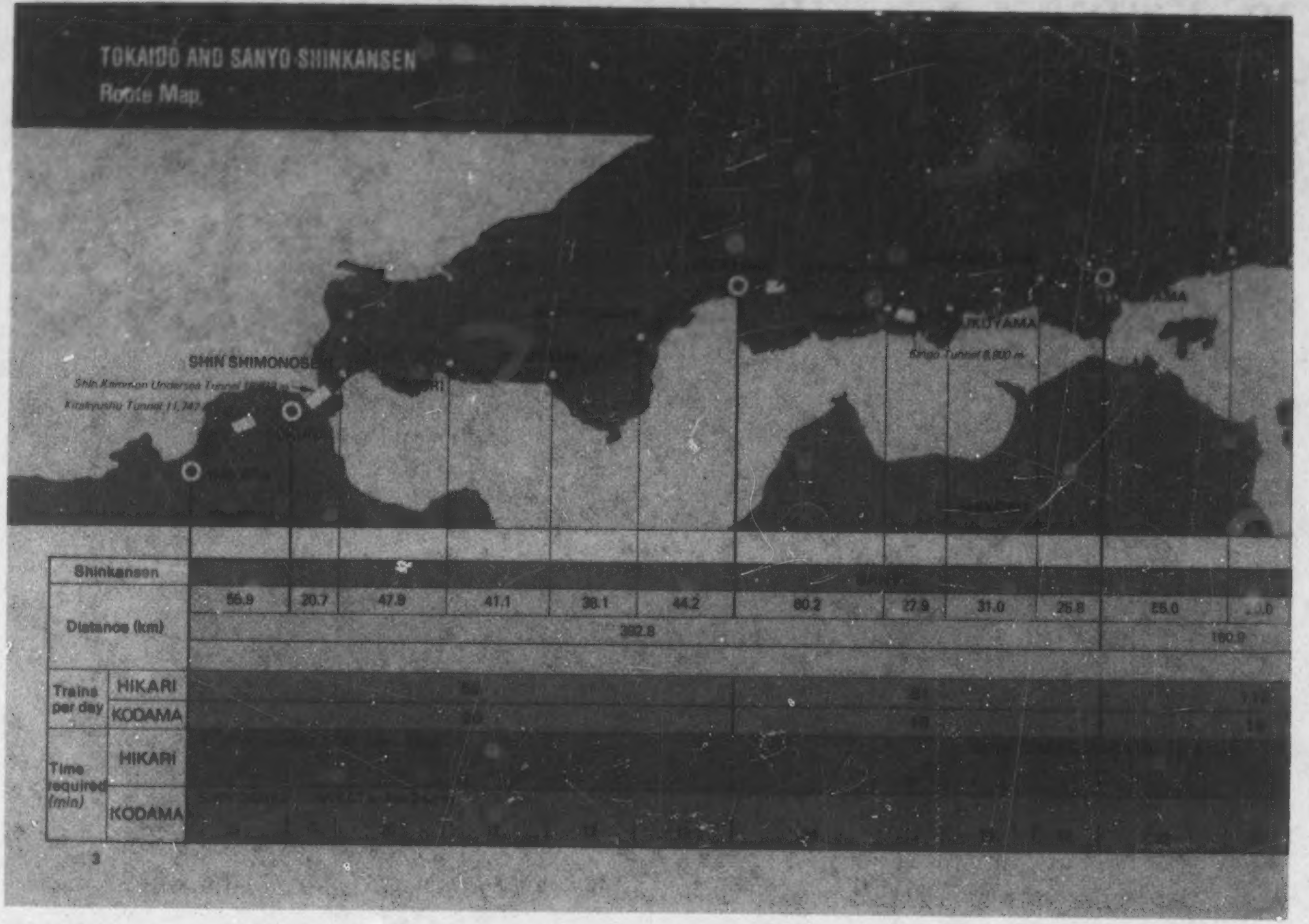
Construction plans for three more Shinkansen lines were approved. Two of these lines, the Tohoku (Tokyo-Morioka) and Joetsu (Omiya-Niigata), are almost completed. The Tohoku Shinkansen is scheduled to open between Omiya and Morioka on June



23, 1982 and the Joetsu between Omiya and Niigata in November of the same year. Construction is in progress between Tokyo and Omiya and on the third, the Narita Shinkansen from Tokyo to New Tokyo International Airport.

Detailed plans for five other Shinkansen lines are under way and general surveys have been completed. Twelve other lines are proposed; preliminary surveys for some of those have been made. Progress continues on the undersea tunnel between Honshu and Hokkaido and suspension road-rail bridges between Honshu and Shikoku.

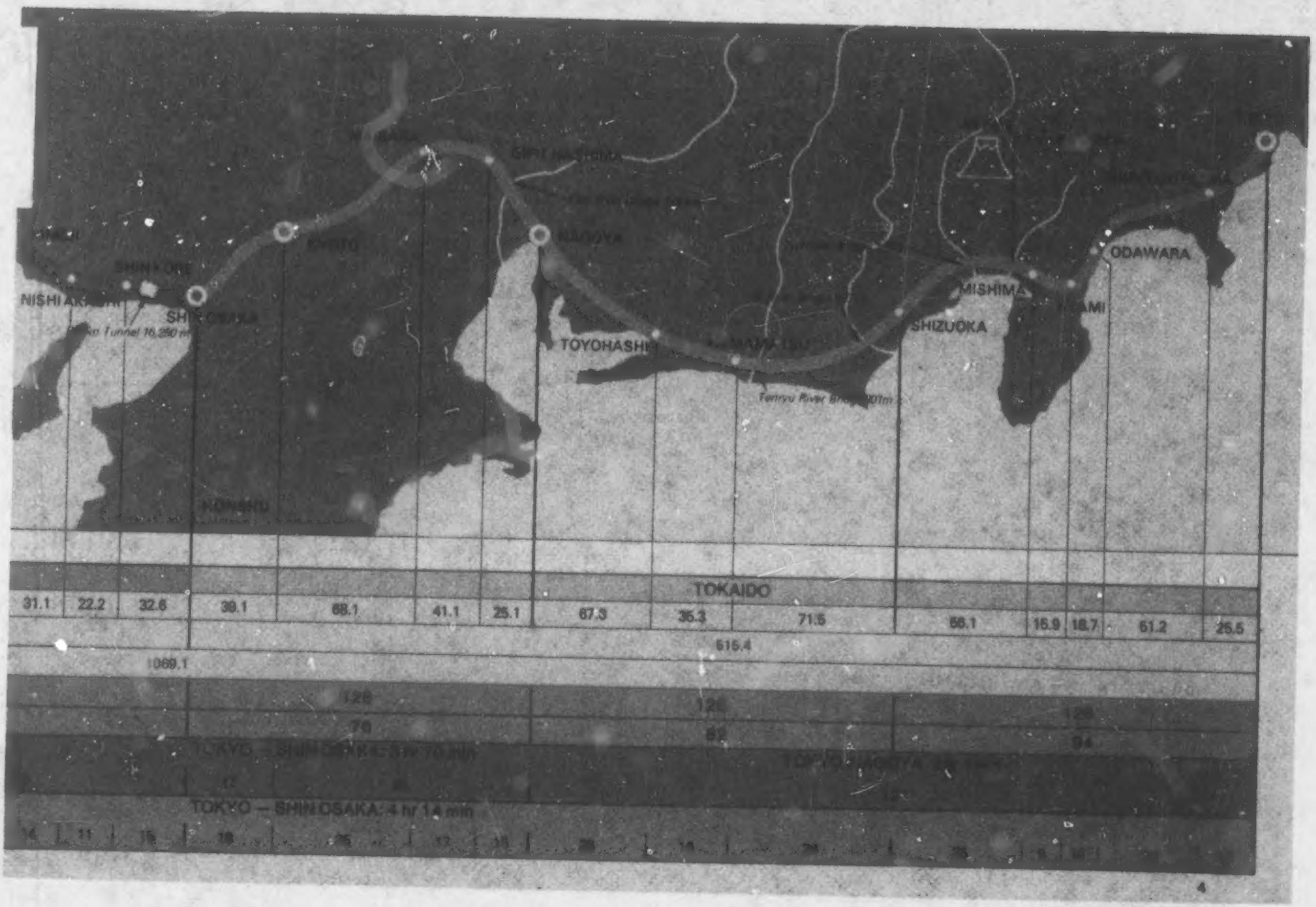
Undersea Tunnel
Between Honshu
and Hokkaido
Niigata
Travel Times
— from Tokyo —
Tokyo
— Hours —
1964 — Before the Shinkansen
1975 — Shinkansen open to Hakata
With lines now under construction or planned
2



TOKAIDO AND SANYO SHINKANSEN
Route Map.

Shinkansen													
Distance (km)		56.9	20.7	47.9	41.1	38.1	44.2	80.2	27.9	31.0	26.8	55.0	[illegible]
		392.8										180.9	
Trains per day	HIKARI	[illegible]						[illegible]				[illegible]	
	KODAMA	[illegible]						[illegible]				[illegible]	
Time required (min)	HIKARI	[illegible]											
	KODAMA	[illegible]											

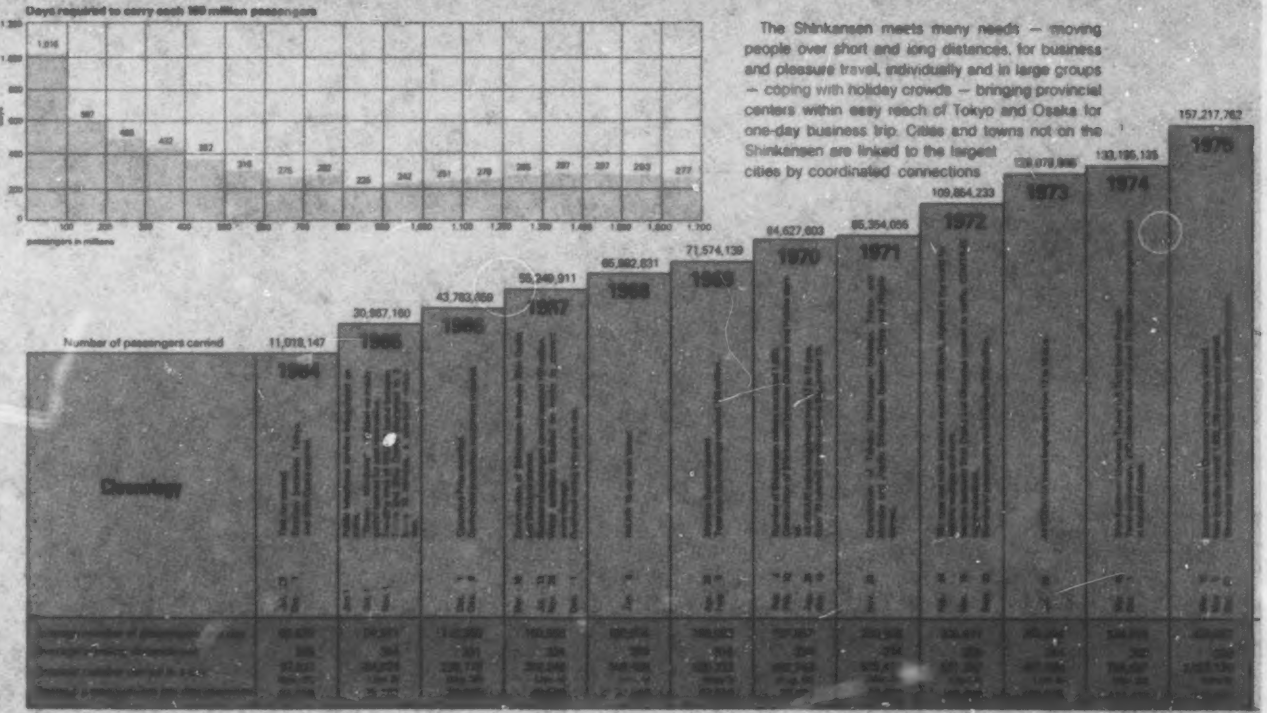
3


NISHI AKASHI
SHIN KOBE
SHIN OSAKA
Tunnel 16,250 m
KYOTO
HONSHU
GIFU HASHIMA
NAGOYA
TOYOHASHI
Tenryu River Bridge
SHIZUOKA
MISHIMA
ODAWARA
TOKAIDO
31.1
22.2
32.6
39.1
68.1
41.1
25.1
67.3
35.3
71.5
58.1
15.9
18.7
51.2
25.5
515.4
1069.1
126
76
126
82
126
94
TOKYO – SHIN OSAKA: 4 hr 14 min
14
11
15
18
25
17
15
28
14
24
25
9
4

Traffic Growth

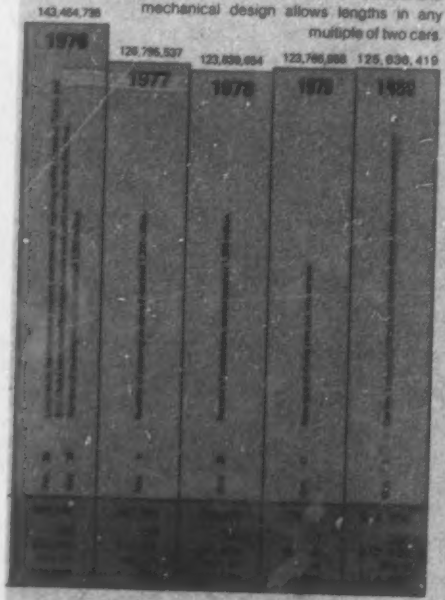
Flexibility

The Shinkansen meets many needs — moving people over short and long distances, for business and pleasure travel, individually and in large groups — coping with holiday crowds — bringing provincial centers within easy reach of Tokyo and Osaka for one-day business trip. Cities and towns not on the Shinkansen are linked to the largest cities by coordinated connections



Service

between the Shinkansen and other trains, made possible by punctual, reliable operation. The popularity of the Tokaido and Sanyo Shinkansen has led JNR to standardize on 16-car trains, though shorter trains could be run where more economical, electrical and mechanical design allows lengths in any multiple of two cars.

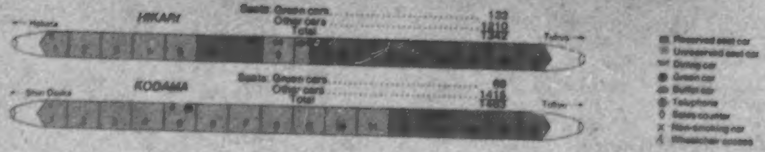


Two types of trains are operated. HIKARI trains stop only at principal stations, connect Tokyo and Shin Osaka in 3 hours 10 minutes, and, on the fastest runs, take only 6 hours 40 minutes for the trip between Tokyo and Hakata. KODAMA trains serve all intermediate stations, with typical travel times of 4 hours 14 minutes from Tokyo to Shin Osaka and 4 hours 24 minutes from Shin Osaka to Hakata. In the peak period, as many as 255 trains are operated a day, 138 HIKARI and 117 KODAMA.

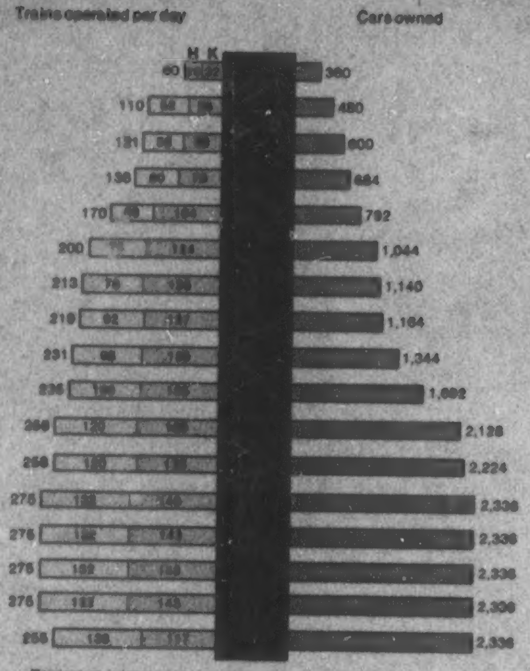
Seat reservations can be made at Midori-no-Madoguchi (green windows), Travel Service Centers in JNR stations and travel agencies throughout the country, and are computer processed.

In the Tokyo area, it is now possible to make reservations direct from home or office by push-button phone. Public telephone service is available aboard Shinkansen trains for calls to and from principal cities along the line.

Passengers coming to Japan on Japan Air Lines (JAL) flights from overseas can reserve Shinkansen seats at JAL overseas sales offices equipped with on-line computer terminals for seat reservations.

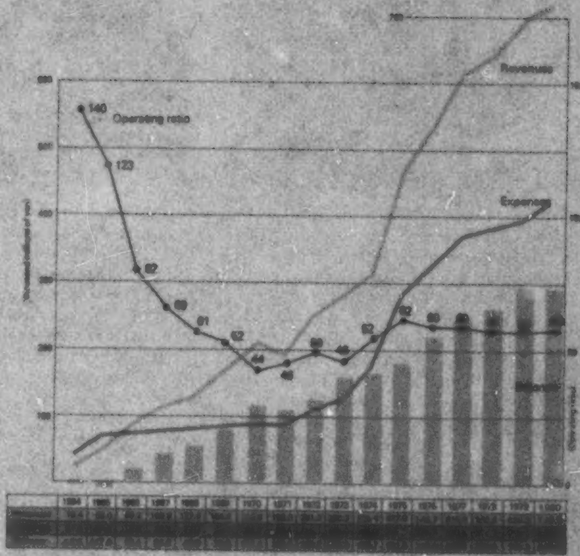


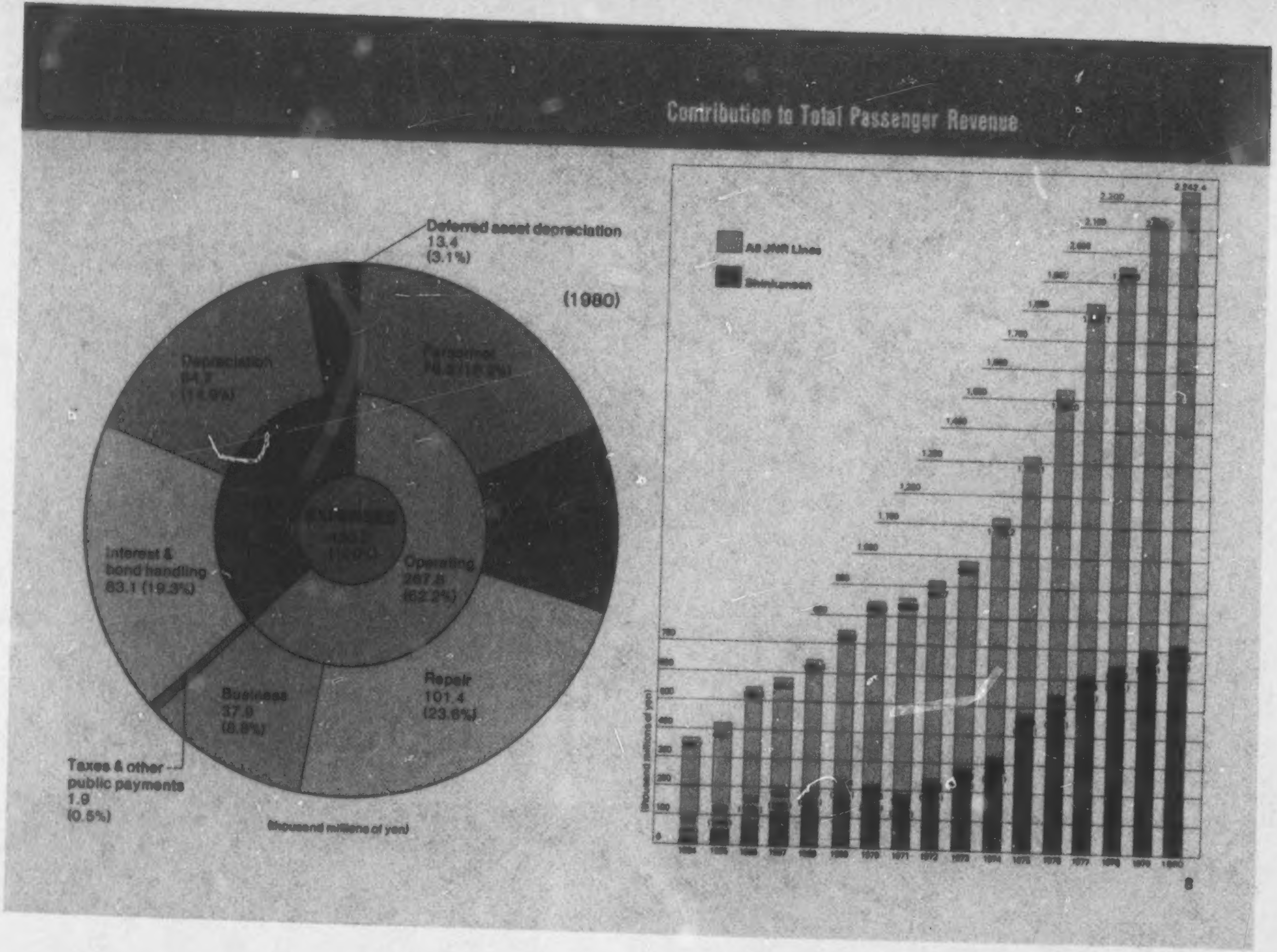
Rolling Stock



(Total scheduled trips on an average day, including both up and down trains. H=Hikari and K=Kodama trains.)

Financial Results





Contribution to Total Passenger Revenue

Safety Measures

Safe operation is essential on the Shinkansen, where train speeds reach 210 km/h.

ATC (Automatic Train Control):

This system sets a maximum limit on the speed of each train, depending on the location of the preceding train and other factors related to operating safety. The maximum permitted speed is displayed in the motorman's cab, and the ATC will slow the train automatically if the actual speed exceeds the one indicated.

CTC (Centralized Traffic Control):

Under this system the route that a train will use in a station is set by remote control from the Center in Tokyo.

COMTRAC (Computer-aided Traffic Control):

Using computers in combination with CTC, COMTRAC adjusts train movements, controls train routes, and prepares revised train diagrams if service is disrupted.

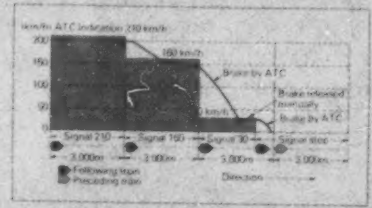
Grade Separation:

All crossings with roads are grade-separated.

Other Safety Measures:

Additional special equipment and procedures are used to guarantee safety in extreme weather or other unusual conditions, by slowing train speed or stopping operation.

Train Separation by ATC: Cab Signal Aspects and Train Running Curve



Control Center

This Center, at the north end of Tokyo Station, remotely controls all aspects of Shinkansen operations. About seventy dispatchers are normally on duty, day and night, working in eight groups. They control passenger information, train running, railcar assignment, electric power supply, signalling, communications, track maintenance, and the COMTRAC system.

Maintenance

Track and Electric Facilities

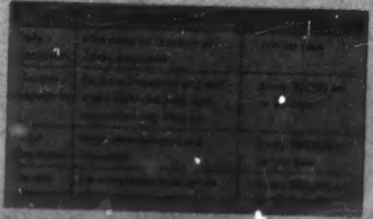
A seven-car multi-purpose inspection train is operated in the daytime on the same schedule as that of passenger trains to inspect, detect and measure irregularities of both track and electric facilities. It is run once a week on the HIKARI schedule and once every three months on the KODAMA schedule. Data collected are analyzed by computer to draw up the maintenance work schedule.

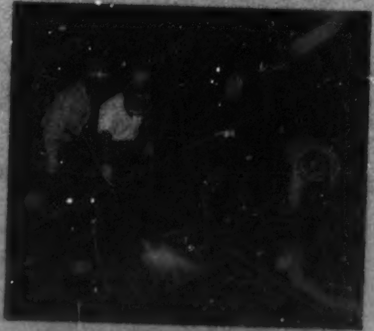
Routine maintenance work is performed at night after regular service ends. Major projects are done on selected nights about six times per year, when morning trains are cancelled and service resumes shortly afternoon.

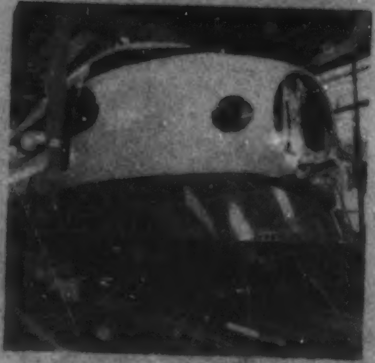
Track condition is also inspected by daily patrol on foot and by recording devices carried on regular trains.

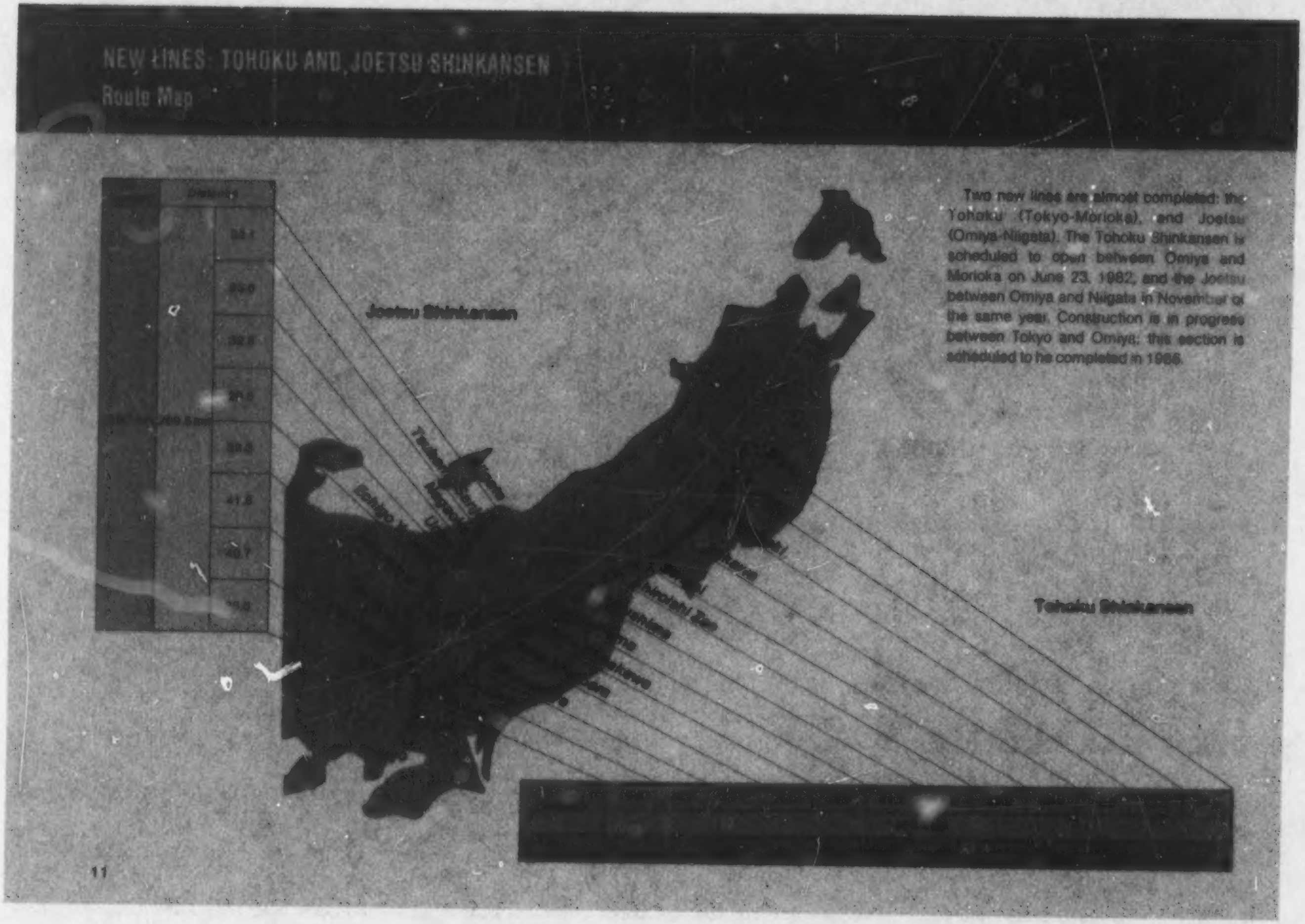
Car Inspection and Repair

Rolling stock components vary in reliability and durability. Various kinds of inspection, therefore, are performed regularly at appropriate intervals.









NEW LINES: TOHOKU AND JOETSU SHINKANSEN

Route Map

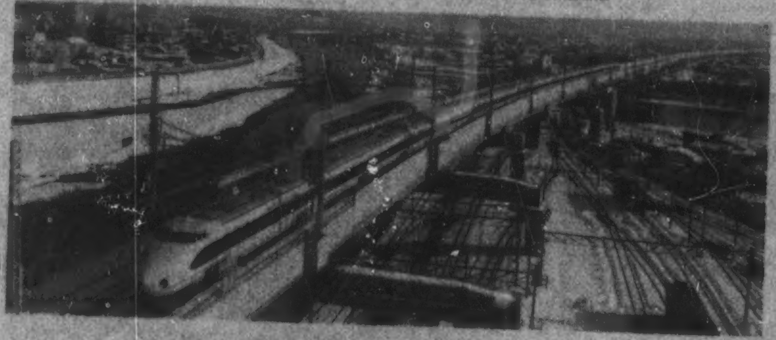
Two new lines are almost completed: the Tohoku (Tokyo-Morioka), and Joetsu (Omiya-Niigata). The Tohoku Shinkansen is scheduled to open between Omiya and Morioka on June 23, 1982, and the Joetsu between Omiya and Niigata in November of the same year. Construction is in progress between Tokyo and Omiya; this section is scheduled to be completed in 1985.

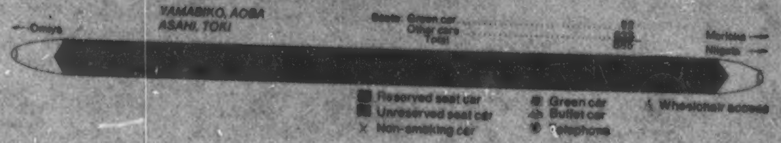
Service

Two types of trains, similar to those on the Tokaido and Sanyo, are to be operated: Yamabiko and Aoba on the Tohoku Shinkansen, and Asahi and Toki on the Joetsu. Yamabiko and Asahi trains stop only at principal stations en route, while Aoba and Toki trains make all stops.

On the Tohoku, ten trains are to run in each direction at the start of service in June, 1982: four will be added in July, and a full schedule of 30 trains each way per day will be introduced in November. On the Joetsu, 21 trains each way per day are to run from the opening date in November. Additional trains between Omiya and Ueno on the existing line will provide direct connections for the Shinkansen. Using these connecting trains to Omiya, it will take 4 hours to go from Ueno to Morioka on the Tohoku Shinkansen, 2 hours 20 minutes shorter than on the conventional line and 2 hours 30 minutes from Ueno to Niigata on the Joetsu Shinkansen, 1 hour 40 minutes shorter than on the conventional line.

Each train on both new lines consists of 12 cars, including a green car (superior accommodations) and a half-car buffet. All seats are reclining in both green and ordinary cars. Seat reservations can be made at JNR stations and travel agencies throughout the country, in the same way as for Tokaido and Sanyo Shinkansen trains. Pay radio telephones are available in each buffet car.





Snow Countermeasures

Both new lines pass through heavy winter snow areas; the section between Jomokogen and Niigata on the Joetsu Shinkansen, in particular, has severe snowfalls, with depths reaching 4 meters. This has required special measures against snow. Tracks between tunnels in mountainous areas are all sheltered to protect them from being blocked by heavy snow or avalanches. On viaducts in open country, an automatic snow melting system is installed. The system automatically detects the start of a snowfall and sprays water to melt the snow before it piles up on the track.

The area along the Tohoku Shinkansen has less snowfall than along the Joetsu, and snow accumulation is usually less than 1 meter. Trains are provided with snow plows; snow accumulates in areas provided on the viaduct. At turnouts snow melting devices quickly melt the blocks of snow that fall from trains. All underfloor equipment is encased to prevent snow adhesion. Snow-air separators are also installed at the air intakes for equipment cooling and car ventilation.

Rolling Stock Bases

There are 3 rolling stock bases, two on the Tohoku and one on the Joetsu. The largest, Sendai Rolling Stock Base, covers about 530,000 square meters, and is equipped to perform all levels of maintenance including general inspection. Rolling stock used on both new lines is inspected and maintained here.

Long Tunnels

The Joetsu Shinkansen goes through the mountains that separate Honshu's Pacific and Japan Sea sides, and advanced tunnelling technology was used to bore long tunnels. There are many tunnels between Takasaki and Nagaoka, accounting for 106 km of the section's 137-km length. The Daishimizu Tunnel, 22,228 meters, is the longest in the world and took 5 years 3 months to complete.

Earthquake Sensors

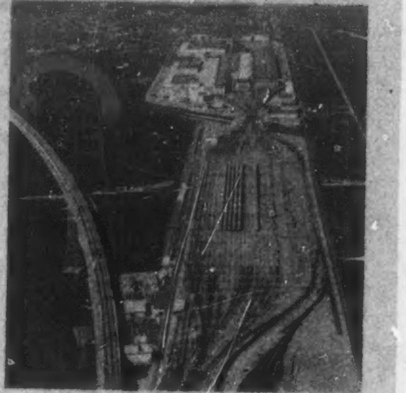
Earthquake sensors are installed at substations along the new lines. When a strong earthquake occurs, sensors work to stop trains automatically. In addition, on the Tohoku Shinkansen, detectors are installed at eight places along the Pacific coast, 40 to 100 km away from the track. Warnings from these detectors are used to reduce train speeds before the arrival of shock waves from an undersea earthquake.

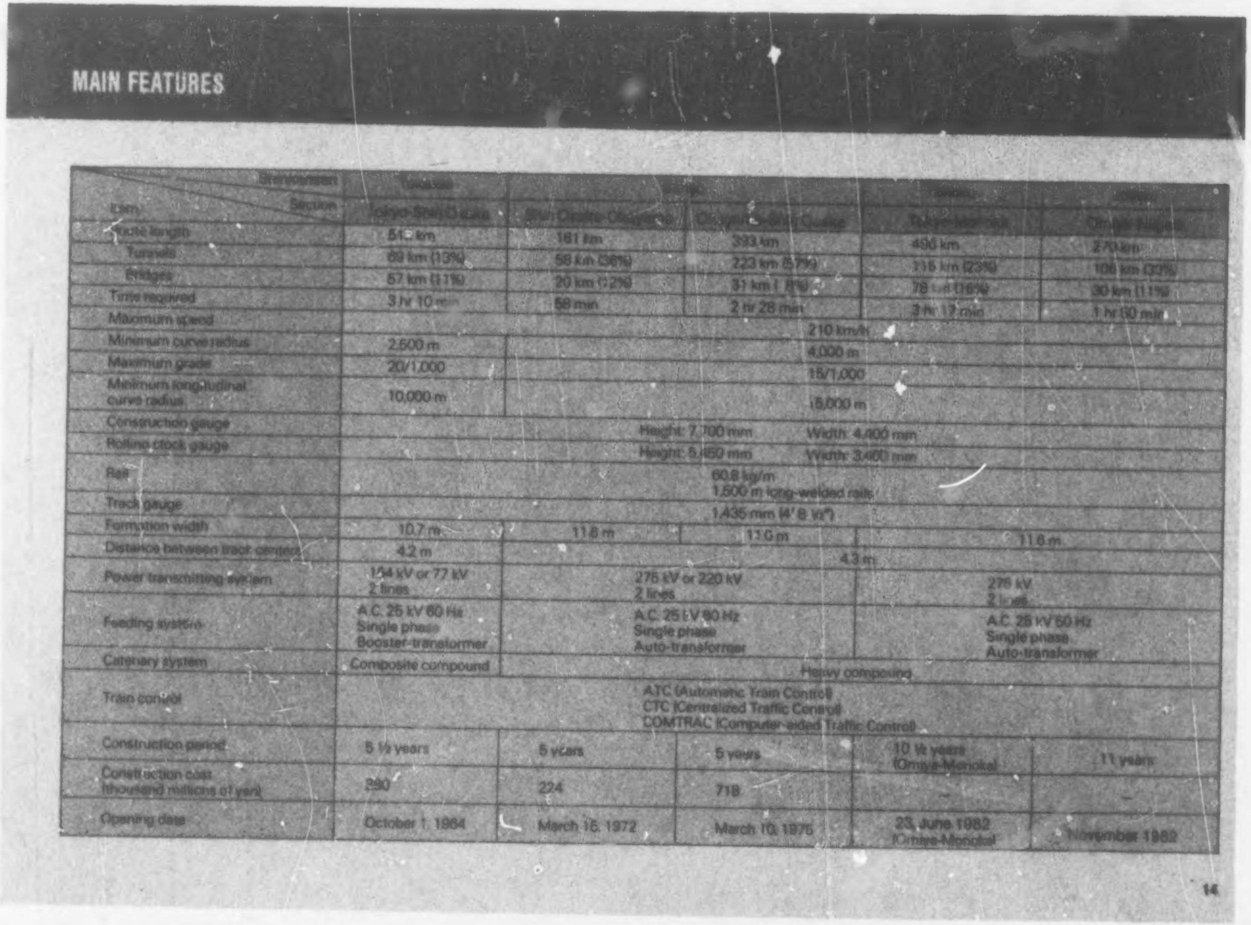
Control Center

Eight groups of dispatchers — train, railcar, track maintenance, electric power, passenger information, and three groups responsible for signalling, communications and systems — control both new lines. The Control Center is in Tokyo Station, adjoining the Control Center for the Tokaido and Sanyo Shinkansen.

Coping with Difficult Conditions

Japan's geography makes railway construction costly and difficult. Much of the country is so mountainous that tunnels and bridges must be built. The Joetsu Shinkansen needed the world's longest tunnel as well as trackside equipment to fight heavy snow. Where the countryside is open, human geography becomes important. Population is dense, even in rural areas, and all Shinkansen lines are free of level crossings, so almost all new construction in flat country is on elevated concrete viaduct. Noise and vibration impacts are reduced by barriers and special construction techniques. These features might not be needed in other countries.





MAIN FEATURES

Shinkansen / Section / Item	Tokaido	[illegible]		[illegible]	[illegible]
	Tokyo-Shin Osaka	Shin Osaka-Okayama	Okayama-Shin Osaka	Tokyo-Morioka	Omiya-Niigata
Route length	515 km	161 km	393 km	496 km	270 km
Tunnels	69 km (13%)	58 km (36%)	223 km (57%)	115 km (23%)	106 km (39%)
Bridges	57 km (11%)	20 km (12%)	31 km (8%)	78 km (16%)	30 km (11%)
Time required	3 hr 10 min	58 min	2 hr 28 min	3 hr 17 min	1 hr 50 min
Maximum speed	210 km/h				
Minimum curve radius	2,500 m	4,000 m			
Maximum grade	20/1,000	15/1,000			
Minimum longitudinal curve radius	10,000 m	15,000 m			
Construction gauge	Height: 7,700 mm Width: 4,400 mm				
Rolling stock gauge	Height: 5,450 mm Width: 3,400 mm				
Rail	60.8 kg/m 1,500 m long-welded rails				
Track gauge	1,435 mm (4' 8 ½")				
Formation width	10.7 m	11.6 m	11.0 m	11.6 m	
Distance between track centers	4.2 m	4.3 m			
Power transmitting system	154 kV or 77 kV 2 lines	275 kV or 220 kV 2 lines		275 kV 2 lines	
Feeding system	A.C. 25 kV 60 Hz Single phase Booster-transformer	A.C. 25 kV 60 Hz Single phase Auto-transformer		A.C. 25 kV 50 Hz Single phase Auto-transformer	
Catenary system	Composite compound	Heavy compound			
Train control	ATC (Automatic Train Control) CTC (Centralized Traffic Control) COMTRAC (Computer-aided Traffic Control)				
Construction period	5 ½ years	5 years	5 years	10 ½ years (Omiya-Morioka)	11 years
Construction cost (thousand millions of yen)	380	224	718	–	–
Opening date	October 1, 1964	March 15, 1972	March 10, 1975	23, June 1982 (Omiya-Morioka)	November 1982

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FEATURES OF THE SHINKANSEN

April 1982

JAPANESE NATIONAL RAILWAYS

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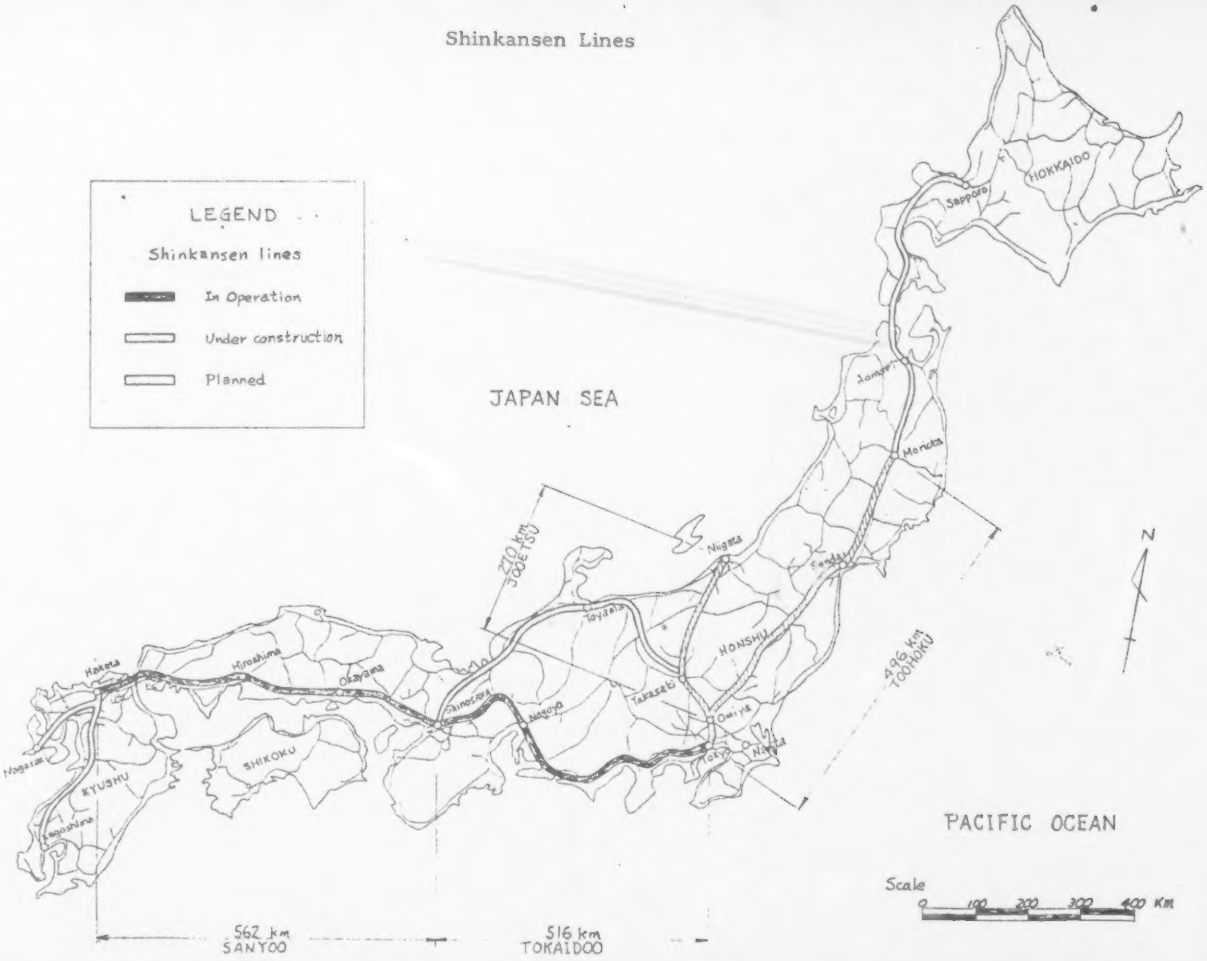
Shinkansen Lines



I. General Description

1. Introduction

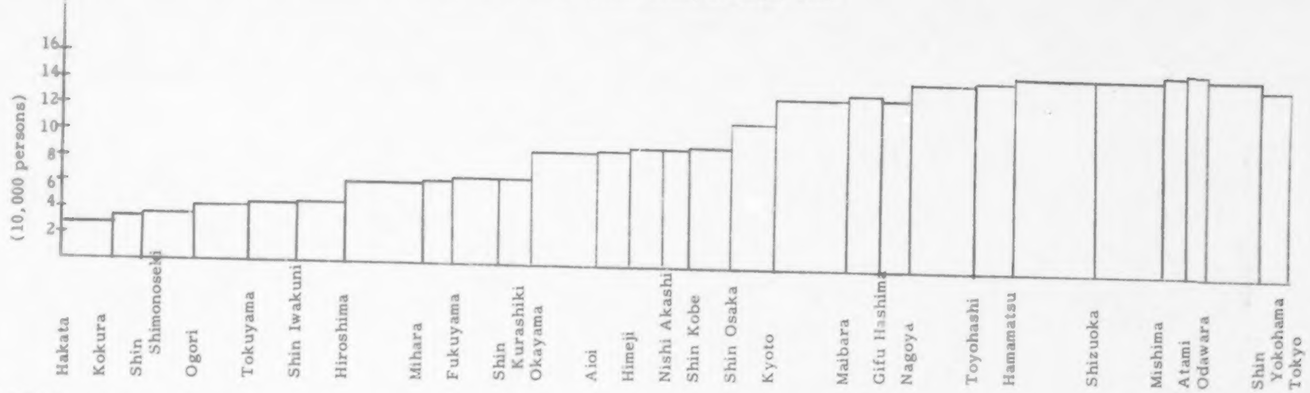
The Shinkansen was inaugurated between Tokyo and Shin Osaka 17 years ago, on October 1, 1964. Subsequently, the line was extended westward, the section between Shin Osaka and Okayama being opened March 15, 1972 and between Okayama and Hakata March 10, 1975. The line thus now connects the main cities of the Pacific coast, from Tokyo to Hakata, over 664 miles (1,069 km).

The Shinkansen has made possible fast travel between Tokyo and Osaka and between Osaka and Hakata in the short time of 3 hr. 10 min. and 3 hr. 30 min., respectively, at the maximum speed of 131 mph (210 km/h), greatly contributing to cultural and economic development of the nation.

Two types of Shinkansen trains are operated,HIKARI trains stopping only at principal stations and KODAMA trains serving all stations.

Since its opening up to 1980, the Shinkansen has carried over 1,700 million passengers, 100 million a year, without a single casualty due to accidents. The Shinkansen has now established itself as a fast, safe and handy transport system of the nation.

2. Traffic by Section (Daily average, 1980)



Distance:

Mile	34,7	12.9	29.8	25.5	23.7	27.5	37.4	17.3	19.3	16.0	34.2	12.4	19.3	13.8	20.2	24.3	42.3	25.5	15.6	42.1	21.9	44.4	34.8	9.9	11.6	31.8	15.8
Km	55.9	20,7	47.9	41.1	38.1	44.2	60.2	27.9	31.0	25.8	55.0	20.0	31.1	22.2	32.6	39.1	68.1	41.1	25.1	67.8	35.3	71.5	56.1	15.9	18.7	51.2	25.5

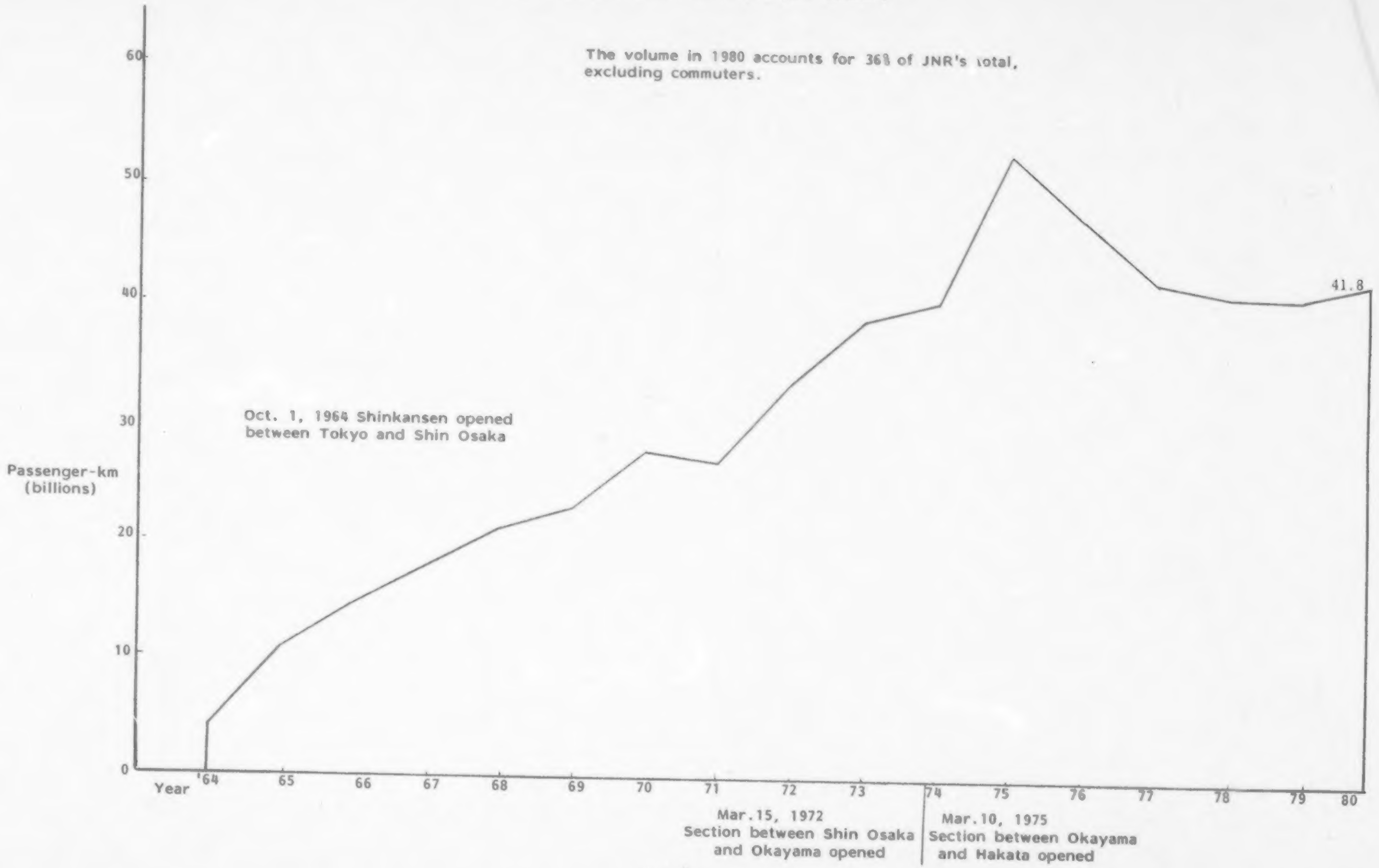
Trains per day

HIKARI	55	81	112	128	126	126
KODAMA	19	19	19	76	82	94
Total	74	100	131	204	208	230
Opening date	March 10, 1975		March 15, 1972	October 1, 1964		

Shinkansen trains daily run about 105,000 miles (170,000 km), four times the circumference of the globe, carrying 340,000 passengers. As many as 233 trains (282 trains at peak) are operated a day, and the single-day ridership record so far is 1,030,000 passengers on May 5, 1975.

There are 28 stations, their average spacing being 24.6 miles (39.6 km), and the average riding distance per passenger is 205 miles (330 km).

3. Yearly Traffic Volume (Tokyo - Hakata)



The volume in 1980 accounts for 36% of JNR's total, excluding commuters.

Oct. 1, 1964 Shinkansen opened between Tokyo and Shin Osaka

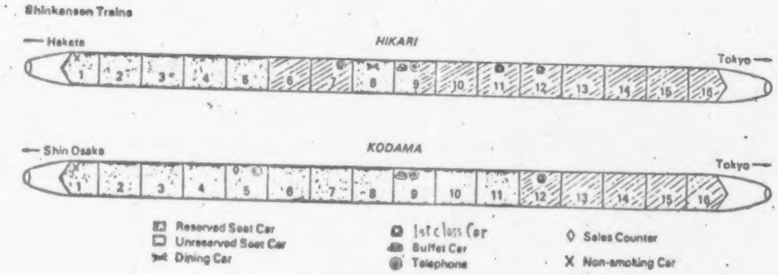
Mar.15, 1972
Section between Shin Osaka and Okayama opened

Mar.10, 1975
Section between Okayama and Hakata opened

4. Rolling Stock

In the initial stage the Shinkansen train was composed of 12 cars. Later, in 1970, HIKARI trains were lengthened into 16 cars, and since 1972, all trains have been composed of 16 motored cars.

Power system	Single phase 25 kV 60 Hz	
Track gauge	1,435 mm	
Signalling system	Cab signal, ATC, train radio, CTC	
Curve radius	Tokaido 2,500 m or more Sanyo 4,000 m or more	
Car dimension	Width 3.4 m Height 4.0 m Length 25.0 m	
Maximum axle load	16 t	
Train length	400 m	
Seating capacity	HIKARI	KODAMA
	1st Class car 132 Ordinary car 1,210 Total 1,342	1st Class car 68 Ordinary car 1,415 Total 1,483



5. Construction Cost

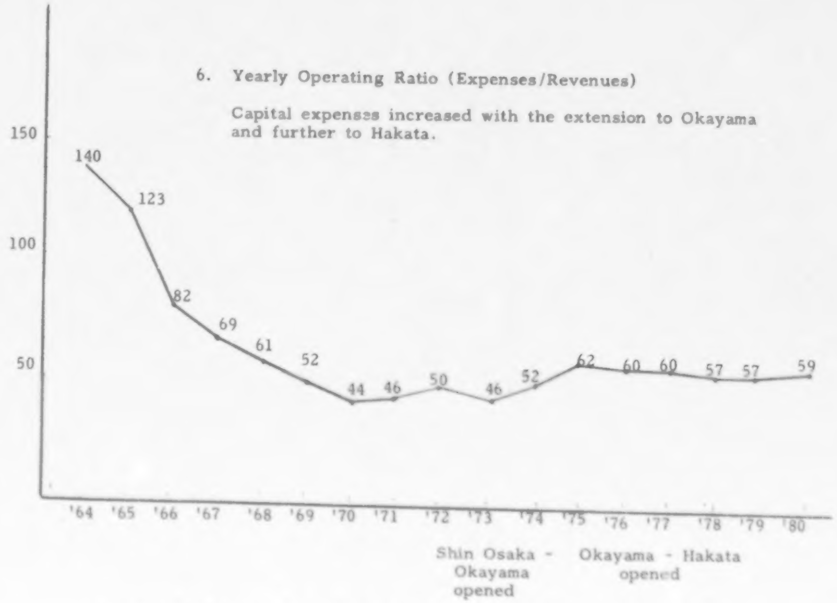
(million dollars)

	Tokaido Shinkansen (Tokyo - Shin Osaka)		Sanyo Shinkansen (Shin Osaka - Hakata)	
	Construction cost	Percent	Construction cost	Percent
Total	888	100 %	3,142	100 %
(1) Ground facilities	545	61	2,077	66
(2) Land	164	19	501	16
(3) Electric facilities	96	11	338	11
(4) Track	83	9	226	7
Construction period	'59 - '64		'67 - '75	
	One dollar = 360 yen		One dollar= 300 yen	

Note: Rolling stock cost and overhead are excluded.

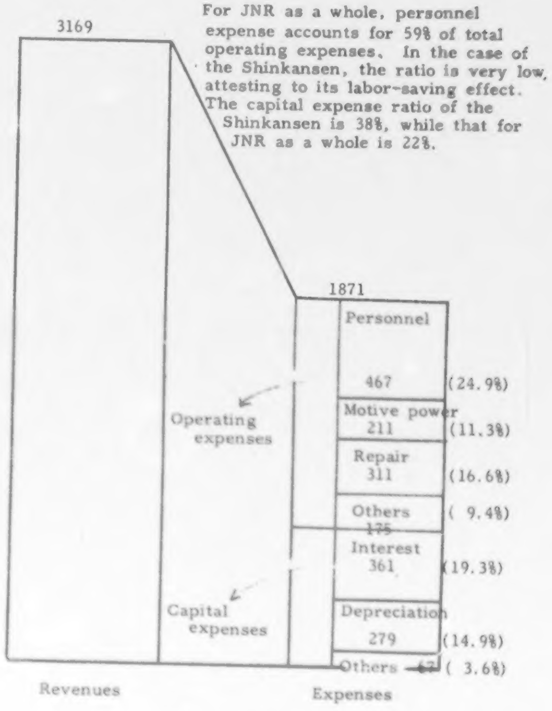
6. Yearly Operating Ratio (Expenses/Revenues)

Capital expenses increased with the extension to Okayama and further to Hakata.



The fare and charge between Tokyo and Shin Osaka (322 miles) amount to about 50 dollars by ordinary car, as of 1980, and the rate (revenue per passenger-mile) is 0.12 dollars.

7. Revenues and Expenses in 1980 (million dollars)



For JNR as a whole, personnel expense accounts for 59% of total operating expenses. In the case of the Shinkansen, the ratio is very low, attesting to its labor-saving effect. The capital expense ratio of the Shinkansen is 38%, while that for JNR as a whole is 22%.

(One dollar = 230 yen)

8. Rolling Stock Utilization

Running 750 miles (1200 km) a day, the utilization of the Shinkansen car is very high.

Year	1980
Annual distance run (1000 miles)	570,860
Number of rolling stock owned	2,240
* Rate in service (%)	89.9
** Rate under repair (%)	5.5
*** Held as spare (%)	4.6

Notes: 1. * ------ rate of rolling stock actually in service (B/A x 100)

2. ** ---- rate of rolling stock under repair (C/A x 100)

3. *** --- rate of rolling stock held as spare to meet peaks or breakdowns. (D/A x 100)

4. A --- Total of rolling stock in use, under repair, and held as spare

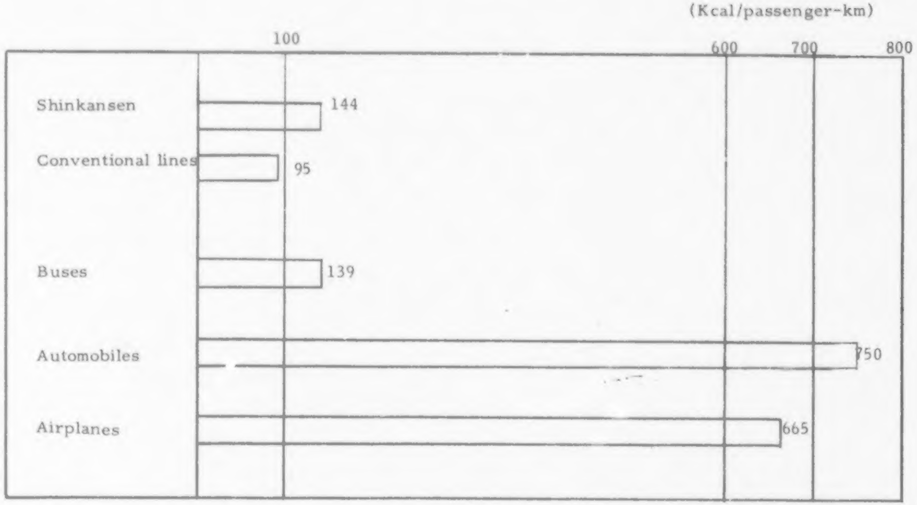
5. B --- Number of rolling stock in use

6. C --- Number under repair

7. D --- Number in reserve

9. Energy Consumption

The Shinkansen is very energy-saving, consuming only 22% and 19%, respectively, of the energy consumed by airplanes and automobiles.



Notes: 1. Results in 1979.

2. Load factors: Shinkansen 50%, airplanes 70%, buses 18.2 persons/vehile, automobiles 1.4 persons/car

II. Impacts of the Shinkansen

1. Introduction

The opening of the Shinkansen signifies a leap from a 65 mph (100 km/h) society to a 130 mph (200 km/h) society, as far as transportation is concerned. This is bound to have a great impact on the communities along the line.

The first is the direct economic impact by the huge investments made for Shinkansen construction.

The second impact is seen in the savings in transportation time and cost made possible by high speed mass transport capacity, which in turn has the effect of inducing new traffic. Furthermore, the route of passenger flow is altered, affecting other competing modes of transportation.

The third is the regional socio-economic impact as a result of the foregoing. For instance, shortened travelling time and reduction of cost has created new opportunities for housing and industrial development and tourism, contributing to more effective land use in regions where such had been considered difficult.

The Tokaido Shinkansen (Tokyo - Shin Osaka) mainly aimed at short-circuiting and integrating the industrial and population high-density areas of Tokyo, Nagoya and Osaka, whereas in the case of the Sanyo Shinkansen (Shin Osaka - Hakata), emphasis lay not only on the regions along the route but also on their hinterland.

2. Impact of Shinkansen Construction

The materials and labor force needed for Shinkansen construction and the impact are as shown below.

	Tokaido Shinkansen	Sanyo Shinkansen
Construction mileage	322	344
Construction period	'59 - '64	'67 - '75
Amount of materials	Cement 1,600,000 t Steel 460,000 t Concrete sleeper 1,670,000 pieces	Cement 3,230,000 t Steel 760,000 t Concrete sleeper 1,000,000 pieces (slab track, extensively used)
Total work force	35,300,000	37,800,000
Impact, including that on employment	Average 70,000 man-days	Average 40,000 man-days

In connection with the Shinkansen construction, redevelopment works were promoted in areas adjacent to the stations.

3. Impact on Transportation

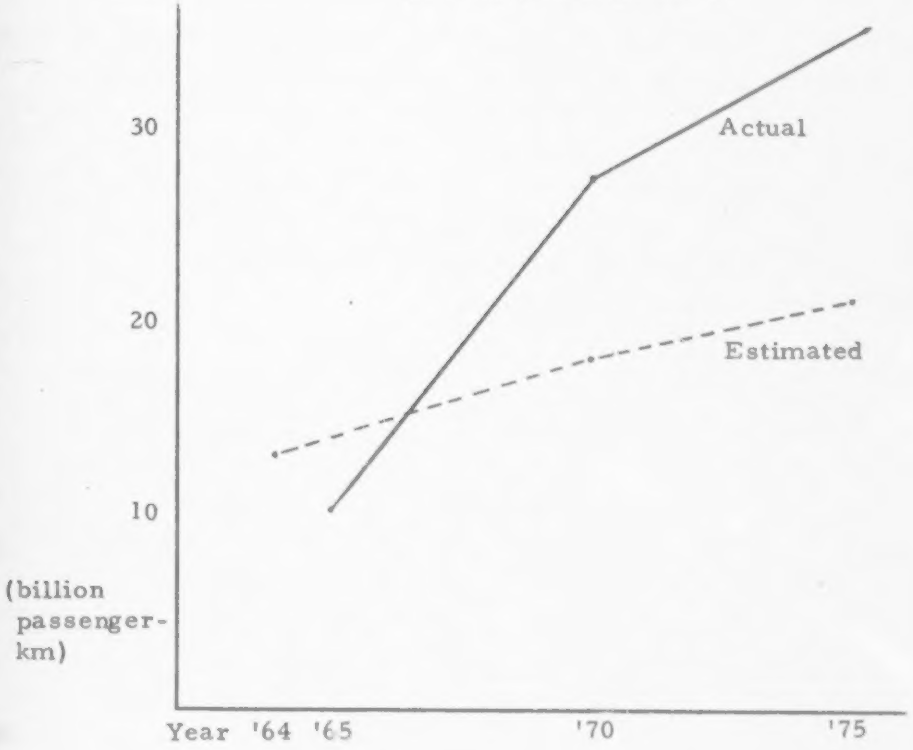
Travelling time reduction made possible by the Shinkansen is as shown below.

	Express train on conventional lines	Shinkansen	Time reduction
Tokyo - Shin Osaka	6 hr 30 min	3 hr 10 min	3 hr 20 min
Osaka - Hakata	8 hr 20 min	3 hr 30 min	4 hr 50 min
Tokyo - Hakata			8 hr

Thanks to the travelling time reduction, traffic steadily increased. In this regard, the Shinkansen is considered to have had a great traffic inducement effect.

Soon after the opening, ridership exceeded the original estimate, attesting to the great effect of time reduction and riding comfort.

Shinkansen Traffic
(Yearly passenger-km)



The Shinkansen greatly affected air traffic. While the Shinkansen traffic increased 66 % in the 2nd year, air traffic showed a big decrease as shown in the table on the right.

Trend of Air Traffic
(Percentage change on previous year)

	Tokyo - Osaka 320 mile (500 km)	Tokyo - Nagoya 200 mile (300 km)
'62. 10 - 63. 9		
	+ 38.5 %	+ 12.0 %
'63. 10 - 64. 9		
	- 19.7	- 45.2
'64. 10 - 65. 9		
	- 27.4	- 68.2
'65. 10 - 66. 9		

← Opening of the Tokaido Shinkansen

Share in 1980

	Shin-kansen	Air-planes
Tokyo - Hakata	34 %	66 %
Tokyo - Shin Osaka	86	14
Tokyo - Nagoya	100	-

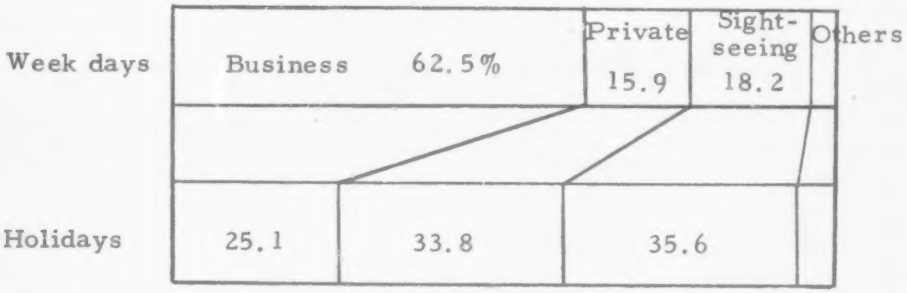
4. Impact on Regional Development

(1) Economic impact

- Increase of business trips

The time-saving effect facilitated business travel and enhanced communication between cities along the route, thus improving business capabilities and augmenting marketing activities.

Purposes of Travel
(Survey of October, 1979)



- Market area expansion

The increase of marketing activities by the opening of the Shinkansen facilitated the advancement to the cities along the route of sales departments of big-name manufacturers in large cities, branch offices of trading companies headquartered in metropolitan areas, chain stores, and affiliated retailers of manufacturers, expanding their market areas.

Furthermore, urban type secondary industries such as those on metalwork and processing began to advance into the terminal cities of the Shinkansen, and from a long range viewpoint, a big impact on industrial development was seen.

This has brought about a change in marketing systems and inter-region and inter-city sales turnover and marketing patterns of commodities.

Number of Branch Offices in Okayama City

	1964 A	1972 B	B - A
Manufacturers	78	170	92
Non-manufacturers	124	208	84

- Tourist business development

Reduction of travelling time facilitated travel to sightseeing areas, enormously increasing the number of tourists. This led to greater activity in the tourist business, such as construction of more hotels with local and non-local capital.

Such development along the route was especially conpicuous when the Sanyo Shinkansen was opened.

Number of Hotels Opened in Hakata

	1972			1974		
	Number	Rooms	Capacity (persons)	Number	Rooms	Capacity (persons)
Ordinary hotel	10	1,440	2,177	15	2,487	3,846
Business hotel	10	620	969	25	2,833	3,905
Total	20	2,060	3,146	40	5,320	7,751

Number of Hotel Lodgers in Okayama

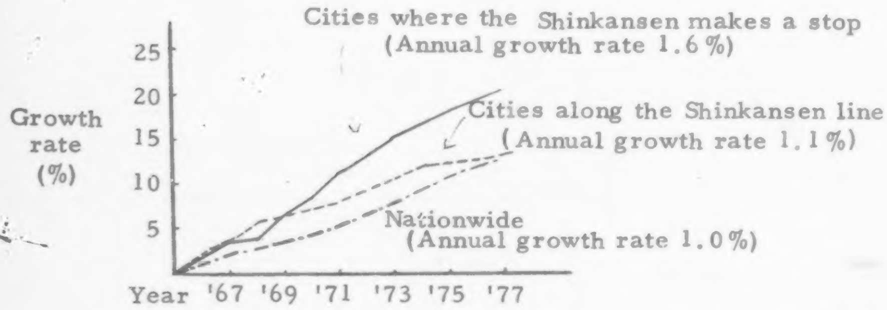
Period	1971 A	1972 B	B/A
Mar. 15 - Mar. 31	39,200	65,600	1.67
Apr. 1 - Apr. 30	67,100	105,400	1.56
May 1 - May 31	64,100	92,700	1.44

(2) Social impact

- Changes in population distribution

Economic development of the areas along the route increased employment opportunities. Furthermore, land suitable for urban cultural and recreational activities was created.

As a result, population tended to concentrate in terminal cities and their environs, while there were also signs of the urban population to disperse.

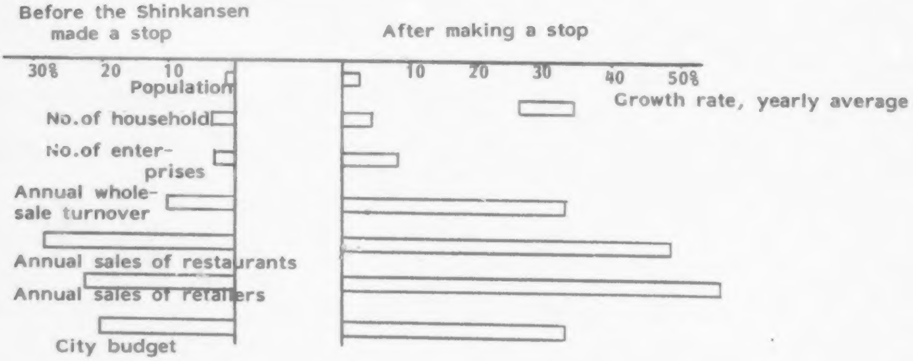


- Changes in administrative and economic functions

Reduction of travelling time enhances economic activities by creating more opportunities for contact with customers, associated companies and financial institutions, and by transforming the core economic management systems and money flow within and between enterprises.

Furthermore, as communication among public agencies became easier, mobility was enhanced such as in the form of more business trips, resulting in changes in the administrative role of each city.

Growth of Mishima City by Being Served by the Shinkansen



The Tohoku and Joetsu Shinkansen to be opened this year will most likely have a fairly great impact on the regions along the route. This is because these lines will pass through areas relatively less developed as compared with the case of the Tokaido and Sanyo Shinkansen.

According to the investigations so far, the further away from Tokyo, the greater becomes the expectations of the new Shinkansen.

New city planning is being promoted in the cities to be served by the Shinkansen trains.

III. Characteristics

1. Management and Operation as a Total System

The Shinkansen is managed and operated as a well-balanced and integrated total system. Integrated in this total system are the hardware consisting of high speed and comfortable riding rolling stock; track fit for high speed and high-density train operation; power supplying facilities; communication and signalling facilities for maintaining safety; and the software consisting of the control system for efficient, safe, and on-time operation of a great number of trains; the maintenance system to back this up; and the seat reservation system for customer service. In other words the Shinkansen is managed and operated as a total system, integrating hardware, personnel, operation, service and maintenance.

The Shinkansen not only offers high speed service between such main cities as Tokyo, Osaka and Hakata, its schedule is well-coordinated with the conventional lines, providing convenient connections with them in these cities and at intermediate stations.

2. Accumulation of High Standard Technology

The Shinkansen is a high quality railway system completed as a result of basic studies, past experience, and repeated experiments by research staff of the Railway Technical Research Institute and other JNR experts of the various branches of railway engineering, and with the cooperation of the highly advanced industries of Japan.

3. High Safety Performance

To secure safe train operation, train speed is continuously and automatically controlled by ATC (Automatic Train Control) so that it will not exceed the speed indicated in the driver's cab.

All Shinkansen crossings with roads are grade-separated.

The Shinkansen is equipped with devices for automatic measurement of earthquakes, wind, rain and other hazards to enable prompt countermeasures.

4. Stable Service

The stability of the service provided is extremely high although as many as 250 trains on the average are operated a day.

Rate of on-time performance (in 1980) --- 99%

$$\text{Rate of on-time performance} = \frac{\text{Train-hour} - \text{delay time}}{\text{Train-hour}}$$

Throughout these 17 years, the incidence of rolling stock failure has been very low as troubles of parts, including the bogie which has a direct bearing on operational safety, have been very few.

Failure rate of rolling stock (1980) --- 0.05 case/ million car-km

5. Efficient Electric Traction System

The electric traction system by AC commercial frequency is adopted. In this system, motive power expense is halved in comparison with diesel operation and maintenance expense is also smaller.

6. Rolling Stock

The electric multiple unit system is adopted. The acceleration-deceleration performance is high and axle load is small. As motive power is distributed to each car, the influence of motive power breakdown is small and stable service is secured. Furthermore, the length of a train can freely changed according to traffic demand without affecting operational performance.

The car width has been made great to make full use of the floor space for greater transportation efficiency and transportation cost reduction. In addition, the spacing of seats has been kept wide to secure greater free space per passenger.

Due consideration has been given to riding comfort such as by adoption of the air cushion bogie and car structure for prevention of changes in air pressure inside the car when passing through a tunnel.

The cars have the capability to meet the requirement for very frequent acceleration-deceleration as they will have to stop at stations spaced short distance apart and must cope with the high density train diagram.

Braking performance is very stable as the electric brake and mechanical brake work on each axle. Furthermore, the life of the brake lining is very long, requiring replacement only about once a year in spite of the frequent braking at high speed.

Electric equipment is consolidated in a two-car unit and underfloor equipment is unified into 2 kinds for easy inspection and maintenance. A panel with switches for temporary measures in case of disorder is installed on every other car, and even crew with little special knowledge can easily handle them.

7. Ground facilities

(1) An average of 250 trains, each sonsisting of 16 cars, are operated a day at the maximum speed of 210 km/h. To meet such a stringent condition, track structures and the catenary have been designed for greater strength.

(2) Complementary dual systems have been used for electric power supply, signalling, and other facilities to secure stable, highly dense transportation.

(3) Taking into account the difficulty of securing maintenance personnel, the noise caused by ballast work, etc., and to reduce maintenance cost as well, slab tracks have been adopted in place of ballasted tracks, this being one example of the labor-saving aimed at in general.

(4) A multi-purpose inspection train is operated at the maximum speed of 210 km/h to accurately inspect, detect and measure irregularities of both track and electric facilities. The measured data are processed by computer for systematic maintenance.

Maintenance work is conducted at night by securing the intervals and employing mechanical means to the fullest extent.

8. Technology Born of the Severe Conditions of Japan

(1) Overcoming severe natural conditions

Much of Japan is rugged mountainous terrain, giving rise to the requirement for many tunnels and bridges. Such structures have been designed and built economically, using the most efficient up-to-date methods.

	Tokaido Shinkansen (Tokyo-Shin Osaka)		Sanyo Shinkansen (Shin Osaka-Hakata)	
	Aggregate length mile/km	%	Aggregate length mile/km	%
Earthwork	170 273	54	44 70	13
Bridge	36 57	11	32 51	9
Viaduct	73 116	22	100 160	28
Tunnel	43 69	13	176 281	50
Total	322 515	100	352 562	100

Japan is one of the countries with such harsh natural conditions as severe earthquakes and heavy snow. The bearing these conditions would have on railway operation cannot be accurately grasped unless dealt with through years of actual experience.

Positive countermeasures against such hazards have been incorporated in the Shinkansen system, based on past experience and modern technology.

As for earthquakes, structures have been designed to be quakeproof, and when earthquakes of more than 40 gal are detected, the power of the area affected is automatically cut to stop the train. In the past 17 years, the Shinkansen encountered quakes of more than 40 gal 88 times, including the maximum of 250 gal, but there have been no damages in particular.

The average annual rainfall was 1,200 - 1,400 mm the maximum being 3,150 mm, and the aggregate rainfall reaching 29,000 mm. Heavy rains of more than 40 mm/h occurred 52 times.

There is a section of the Tokaido Shinkansen where snowfall is seen about 20 days a year, with the snow reaching a maximum depth of 50 cm. Countermeasures have thus been taken in both the ground facilities and rolling stock.

(2) Use of continuous viaduct

The Shinkansen passes through many densely populated areas. In these areas where there are frequent intersections with roads, it has been found better to construct a continuous railway viaduct than to resort to individual grade separations.

Moreover, when the soil condition is bad or the price of land is high, concrete viaduct could be advantageous compared with banking. Thus viaducts have been extensively used on the Shinkansen.

(3) Adjustment with city functions

Stations of the Shinkansen are mostly located in the city center, providing good connection with city transportation. In planning and constructing stations, therefore, adjustment has been made with various city problems and complicated works in built-up areas have been effectively executed to achieve the desired aims.

(4) Severe environmental standards and countermeasures

Extremely severe standards on the level of noise and vibration have been set up by the Environment Agency. Accordingly, various measures have been studied, developed and taken, and the peak noise and vibration from running trains have been checked to below 80 dB and 70 dB, respectively Furthermore, measures for preventing inductive interference on communication lines in cities and areas along the Shinkansen route have also been taken.

IV. Future Prospects

1. Shinkansen Lines Planned

Following the Tohoku and Joetsu Shinkansen to be completed soon, environment impact studies and review of construction execution plans are now under way for the following lines.

Tohoku Shinkansen (Morioka - Aomori)
106 miles (170 km)

Hokkaido Shinkansen (Aomori - Sapporo)
221 miles (354 km)

(Including Tsugaru Straits Line,
34 miles (54 km)

Hokuriku Shinkansen (Takasaki - Toyama - Osaka)
369 miles (590 km)

Kyushu Shinkansen (Hakata - Kagoshima)
155 miles (250 km)

Kyushu Shinkansen (Hakata - Nagasaki)
81 miles (130 km)

2. Speed Increase

Many high speed test runs have been conducted with the Shinkansen.

· 1962 - 1964	Shinkansen Model Track (Kamonomiya)
March 1963	Maximum speed 159 m/h (256 km/h)

- 1972 Between Aioi and Shin Kobe on Sanyo Shinkansen

  February 1972 Maximum speed 178 m/h (286 km/h)

- 1978 - 1980 Shinkansen General Test Track (Oyama)

  December 1979 Maximum speed 198 m/h (319 km/h)

Through these tests, it was confirmed that there is no problem in running at the high speed of 160 miles/h. However, in Japan rigorous restrictions apply to the noise caused along the line, in view of which, speed increase is being approached very cautiously.

3. Car Accommodations

Based on the experiences of the Tokaido and Sanyo Shinkansen, and taking into account the regional characteristics and the changes that have taken place in the standard of living, many new designs have been introduced into the rolling stock for the Tohoku and Joetsu Shinkansen.

(1) Seats, the most important of accommodations, have been made more pleasing and comfortable by refinements based on 17 years of experience.

(2) New material and color effects were adopted to create a warm and relaxant atmosphere in view of the cold area through which the cars will run and changes in life style.

(3) Studies are under way on the design and use of lounge cars and compartment cars in anticipation of possible future needs.

4. Maglev System

The following is a brief account of Maglev development in JNR.

(1) At the Railway Technical Research Institute, Tokyo

Early 1960s --- Study was started and continued.

1975 --- Off-the-ground running was achieved by experimental vehicle levitated by superconducting magnetic and propelled by linear synchronous motor.

Vehicle dimensions (L x W x H)	16.4 x 7.2 x 3.3 (ft) 5 x 2.2 x 1 (m)
Vehicle weight	3.6 tons
Guideway length	0.3 mile (480 m)

(2) At the Miyazaki Test Track

1977 --- Running tests were started.

Dec. 1979 --- 323 m/h (517 km/h) was achieved.

Guideway shape	Inverted T
Guideway length	4.4 miles (7 km)
Vehicle dimensions (L x W x H)	44.3 x 12.1 x 8.9 (ft) 13.5 x 3.7 x 2.7 (m)
Vehicle weight	10 tons

1980 --- The inverted T-shaped guideway was remodelled into one of U-shape and running tests were resumed.

1981 --- Running tests were conducted with 2 vehicles coupled.

1982 --- Running tests with 3 vehicles coupled planned.

Guideway shape	U
Guideway length	4.4 miles (7 km)
Vehicle dimension (L x W x H)	33.1 x 9.8 x 10.8 (ft) 10.1 x 3 x 3.3 (m)
Vehicle weight	10 tons

4

Mr. GLICKMAN. I would like to at this point call on Mr. Scher, from the French National Railroads, who testified so ably yesterday. We had some conflicting testimony yesterday, and Mr. Scher felt that it might be useful if he were able to come back and perhaps give some amplification. Proceed, Mr. Scher.

STATEMENT OF DAGOBERT SCHER, ASSISTANT GENERAL MANAGER FOR NORTH AMERICA, FRENCH NATIONAL RAILROADS

Mr. SCHER. Thank you, Mr. Chairman. Well, as you indicated yesterday, what made me ask to have this opportunity was that there was some very strong accusation made against French railroads during the testimony conducted by General Electric. I wish at this point to challenge some of these remarks, and also clarify some others.

Let me take the clarification first. One of the things that was said was a comparison between the number of railroad employees per mile in the United States and in France, and it left a certain doubt as to the quality and productivity of the French railroad worker. I do not deny that the productivity in America on the railroads is very high, but I would like to clarify this comparison.

No. 1, the United States covers an area which is 20 times that of France, and on the other hand, the United States has only 4 times the population of France. In other words, you have a population density in France which is about five times that of the United States. Obviously in America you still find huge open space in the West, where you have tracks that run for miles without hitting a single town, and that requires very little personnel. This is not the case in France, and it is certainly not the case in Japan. In addition, French railroads handle annually 700 million passengers, which represents roughly the entire population of China that is being carried in 1 year on the train. And when you have such a huge passenger traffic, obviously the problem becomes entirely different, and so yes, we do use more people than our American colleagues, but as I indicated yesterday in my opening remarks, we cannot compare the two systems because the conditions are absolutely different.

No. 2, GE accused the French of prohibiting foreign manufacturers from bidding or selling in France, and it was inferred at that time that America had financed the TGV partly, and yet France had prevented Americans from competing in this market. This is really why I requested this opportunity. First of all, this is entirely false, and it is a misrepresentation of facts. Let me take financing first. The financing that we obtained was not tied to purchase like it is sometimes in certain financing of purchases in this country. We borrowed money from American financial institutions and we paid interest for this money, the high interest that is charged by these institutions on the market, on the open market, and we are repaying the loan. It was neither a grant, and it was not a preferential loan. It was a purely regular financial transaction.

No. 3, there is no regulation which prevents a foreign manufacturer from selling in France or to sell to the French railroads. In fact, the only thing you have to do is watch TV or see some of the business magazines that appeared in this country and you would have seen an advertisement by ITT promoting the fact that they supplied the suspension of the TGV. If you look at the TGV, yes the TGV was not built as a train by a foreign manufacturer, but many components are foreign. Timken Roller Bearing, an American company. Westinghouse air brake equipment. We used SPENO rail welding equipment. Speno is an American company. German brakes, Dutch shock absorbers, Icelandic refrigeration, and I can go on. So obviously for us there was no way to use GE technology for high speed, because to my knowledge, or at least up to now, I have not seen a tested and proven high-speed technique done by GE. So I thought it important that at this time we put the record straight.

Mr. Chairman, I really thank you for having allowed me this opportunity.

Mr. GLICKMAN. I thank you, Mr. Scher. So we get the record straight, you are saying there is no law or regulation on the books to prohibit a U.S. or any other foreign purchase for the TGV?

Mr. SCHER. That is correct. The same is true for any other equipment, as a matter of fact.

Mr. GLICKMAN. For any equipment of the French National Railroad?

Mr. SCHER. Exactly.

Mr. GLICKMAN. Do you know offhand what percentage of the capital investment was U.S. components?

Mr. SCHER. No; I do not. I would not like to attempt a guess. This was of course, you know, subcontracted equipment from the major manufacturers, which are Alsthom Atlantic and FrancoRail, the main builder of the equipment.

Mr. GLICKMAN. Again what you are saying is there was substantial U.S. involvement?

Mr. SCHER. I do not think it was substantial. There was U.S. as well as other foreign corporations. Perhaps not substantial, but there was some, which proves the point that it was not prohibited.

Mr. GLICKMAN. Naturally we would like to have as much of our manufacturers involved as possible, but you are saying there was no prohibition against American manufacturers?

Mr. SCHER. No prohibition whatsoever.

Mr. GLICKMAN. Mr. Benjamin, do you have any questions?

Mr. BENJAMIN. I was not a participant in the dialog. However, I appreciate the comments of the gentleman.

Mr. GLICKMAN. We thank you for your testimony.

Our next witness is Mr. Lawrence Gilson, vice-president for corporate development of Amtrak.

Mr. Gilson, it is a pleasure to have you here. We have talked before. I know that you have been involved in the new American High Speed Rail Corp., and so after you finish your statement we may want to ask you questions regarding that. You may proceed as you wish.

STATEMENT OF LAWRENCE D. GILSON, VICE PRESIDENT, CORPORATE DEVELOPMENT, AMTRAK

Mr. GILSON. Thank you, Mr. Chairman.

Mr. Chairman, Mr. Benjamin, ladies and gentlemen. More than a year ago, following extensive contact with both the Japanese and

French railroads, Alan Boyd, president of Amtrak, publicly expressed the belief that high-speed passenger trains could be built and operated in the United States profitably. Since that time a sustained effort has been under way to test that assumption and make that dream a practical reality.

Amtrak has made the effort to facilitate the introduction of high-speed passenger trains into the United States a high priority because of our firm belief that the successful introduction of such service, either by Amtrak or someone else, will result in such favorable public reaction that a new awareness will result about the availability and attractiveness of modern rail service that will benefit all passenger carriers. We expect to see a direct payoff in increased Amtrak ridership from the introduction of a high-speed train by anyone. Now that we have concluded that the only way to successfully introduce high-speed trains is through a private company, further commercial opportunities exist for Amtrak to profit by the grant of certain rights and the provision of certain services to that private company.

In our efforts to pursue the high-speed rail project, Amtrak has arranged for Japanese financing for the conduct of preliminary engineering feasibility studies, conducted by teams of engineers drawn from the group at the Japanese National Railways responsible for the design and construction of the famed Shinkansen bullet train lines. We have also brokered the creation of a new private company, the American High Speed Rail Corp. This new company, of which I am honored to be president, is coordinating the conduct of feasibility studies, arranging financing, will oversee the construction of the new high-speed lines, and operate the systems in those cases where the new company is involved. Amtrak further assisted in the creation of the new company by making it a loan of funds from nonappropriated sources at a commercial rate for the conduct of marketing and other studies not being financed by the Japanese.

I will not comment about the technical aspects of high-speed rail, because I could not hope to touch the comments made already by our friends from other railroads, and I expect will be made throughout the course of the rest of this hearing. I would, however, like to describe certain of the conclusions which we have reached about the conditions which must be present in the United States in order to make the introduction of high-speed rail service a practical reality. These factors include at least:

One, high-density, heavily traveled transportation corridors in which existing transportation alternatives are strained to capacity;

Two, access to a proven technology in order to avoid the necessity of engaging in extensive, expensive research and development (a need to engage in such an R. & D. phase as a prelude to design and construction of an American high-speed train would certainly foreclose the possibility of financing the project with private funds);

Three, availability of already assembled rights-of-way or large elements of a right-of-way which could be assembled without extraordinary cost or time delay;

Four, we believe that a relationship should exist between whoever does operate the high-speed trains and Amtrak so that that entity, whoever it is, can acquire the necessary operating rights if the route is one for which Amtrak has exclusive rights today, and in order to arrange for the shared use of the Amtrak national reservations system, stations, coordinated schedules, et cetera;

Five, strong support from Federal, State, and local leaders in order to help address permitting, licensing, taxing, and a myriad of other problems which inevitably arise with any project of this magnitude and complexity.

Finally, six, heightened understanding in the American financial community of the factors which distinguish the economics of high-speed trains from other kinds of railroad financing projects, including the record or profitability high-speed trains have exhibited in other parts of the world.

The studies conducted to date give us a high level of confidence that the necessary conditions which I have just listed either now exist, or can be made to exist.

At least with regard to Los Angeles to San Diego, and certainly we expect with regard to other routes, we are optimistic that high-speed trains will come to the United States, and that it can happen soon. Once the threshold has been cleared and the financing for the first project has been arranged, wherever it is located we believe that the demand for development of other routes will be so great, and the prospects for arranging financing so enhanced, that we will in fact be creating a new industry in the United States. To justify the necessary level of investment to rebuild the passenger rail supply industry in this country, business leaders must see a sustained demand for their products. The peaks and valleys of equipment orders have taken their toll. Only a single domestic manufacturer of rolling stock remains.

The lack of investment in new passenger rail systems has had its effect also. No substantial American research and development of fixed rail passenger systems is underway on a large scale in the United States today. Declining commitment to passenger rail service in the face of substantial Government investment in other modes of transportation also has a price tag.

Throughout the last century the railroad was a key factor in expanding America's industrial and residential frontiers. The railroads created jobs, demanded new technology, fueled our national vitality, and charged the national imagination. Today, high-speed rail service can play that role again. American high-speed trains will provide the quickest, safest, and most comfortable mode of travel in busy transportation corridors. At least as important, the introduction of such trains can help us find new ways to link public- and private-sector initiatives; it can help the Nation create new jobs and new demands for technology; and it can once again charge the awesome imagination and creativity of the American people.

The potential benefits make the major effort worthwhile.

Mr. Glickman. Thank you, Mr. Gilson.

I have a couple of questions. First of all, how does the experience with Amtrak support an optimistic and profitable future for a high-speed rail passenger system in America?

Mr. Gilson. I would make a couple of points in that regard. First, the experience with Amtrak is akin to the experience in other railroads. There was quite an exchange that took place when

Dr. Takahashi sat here a few moments ago about the relationship between the profitability of a high-speed service and the requirement for subsidy for conventional train service. This is the experience throughout the world. The French National Railroad also receives Government support, as do all other conventional train systems in the world. We think that the distinction is a crucial one between the economics affecting conventional trains and those affecting high-speed trains.

The 59-percent operating ratio in Japan for the bullet train is sufficient to throw off cash which is able to subsidize or offset losses in the conventional trains. The subsidy requirement in the form of interest reductions and direct grants for the Japanese railroads is about $4 billion in American a year. It is important to note that there is a significant distinction between high-speed and conventional service.

Mr. GLICKMAN. What was the $4 billion a year?

Mr. GILSON. The total subsidy requirement for the Japanese National Railway system which is attributable to the losses accrued as a result of operation of conventional train service, even after factoring in the surplus funds which are available to the conventional trains as a result of the profits of the bullet train.

Mr. GLICKMAN. OK. My second question, it is my understanding that Amtrak's fiscal year 1983 budget would eliminate all funds for State trains, is that correct?

Mr. GILSON. This is the proposal of the administration; yes, sir.

Mr. GLICKMAN. I am not going to argue the policy of that right now, because that is not the ambit of this committee, that is more in Mr. Benjamin's jurisdiction. Is that consistent with the policy of supporting the bullet trains in other States? For example you have picked a region of the country, southern California, where they operate trains between San Diego and Los Angeles. Corridors in Florida between Miami, Orlando, and Tampa, and in Texas between Dallas and Houston have been mentioned. It looks like you are talking about giving up the sharing arrangement with the States on the one hand, and on the other hand you are forming a high-speed rail corporation which will fund operations within one State. I wonder if you would comment on an apparent inconsistency there.

Mr. GILSON. Yes; Mr. Chairman. I should emphasize that the proposal to eliminate the State 403(b) program, the Federal role in that program is not a proposal of Amtrak. It is a proposal of the President. As recently as last year the Congress did consider the question of what the appropriate role for sharing costs would be on the so-called 403(b) trains and concluded that there would be an appropriate role for the Federal Government in sharing a portion of those costs, and our budget submission from Amtrak operated on the assumption that that provision in law would remain intact.

Mr. GLICKMAN. So what you are basically saying is that that policy decision will be made by the President and the Congress, and you are pursuing this other role independently, so to speak?

Mr. GILSON. Yes, sir.

Mr. GLICKMAN. The only reason I ask that is because any seed money that you provide for this new high-speed rail corporation you say will come from nonappropriated funds, which I understand would perhaps be the sale of real estate and other assets. Those funds theoretically could be used by Amtrak in terms of its general operational—well, just operating the system. Is that correct? What I am trying to say is, in fact, even though you are not using operational funds, you might have funds there that could be used to help subsidize the existing rail system?

Mr. GILSON. Yes, sir.

Mr. GLICKMAN. I am not arguing with you on the merits. I am saying, in fact, you are taking assets of yours and appropriating them for other purposes.

Mr. GILSON. Yes, sir; but I would emphasize, Mr. Chairman, that what we have done with this limited amount of money is to provide a commercial rate loan which will be repaid at a commercial rate and we do not foresee any additional use of Amtrak funds on which this transaction occurred. I would also emphasize that we have proceeded entirely on the assumption that no Federal funds would be forthcoming on this project. They would have to be financed in the private sector.

This explains in part why we felt it was important to have an independent corporation started distinct from Amtrak.

Mr. GLICKMAN. Would Amtrak own any stock in this corporation?

Mr. GILSON. Amtrak has no ownership in any way, shape, or form today in the new company. Frankly, I would hope that over time Amtrak might acquire a minority interest in the company in exchange for certain considerations and services it would provide. This would be our hope but it is not the case today. The reason we must have a separate corporation in the private sector in order to pursue this is that it is simply not possible to attract the level of private financing necessary to build these systems to Amtrak directly.

The investment community requires a separate independent corporate entity and that is the principal reason we have taken this approach.

Mr. GLICKMAN. Why did you pick the Los Angeles-San Diego corridor as a place to begin?

Mr. Benjamin raised some issues before to Dr. Takahashi as to whether the Shinkansen would be adaptable to non-Sunbelt places. I noticed that all of the proposed initial discussion points are all in the Sunbelt area and I am just wondering if there was any rationale for that.

Mr. GILSON. Well, first I would say that we do consider a variety of potential routes out of a Chicago hub to be very promising for development on a profitable basis.

The reason we selected Los Angeles and San Diego as the first route is that it has all of the characteristics that we think are needed to make this a going concern; and I think we must have a demonstrated profitable first instance in order to have the catalytic effect of generating demand in other routes.

Those characteristics include extreme population density and growth in population at a rapid rate. It includes a high incidence of travel within the corridor with roughly 110,000 trips being taken today between Los Angeles and San Diego.

It includes the fact that the transportation alternatives currently available are really one highway artery, I-5 between Los Angeles and San Diego, which carries over 90 percent of all the travel between the end points, and most of the intermediate traffic—that highway is virtually clogged to the limits today—and projections call for a doubling of demand for capacity on that highway between now and the end of this century.

So, we chose it for those reasons, coupled with the fact that it is all within one State, which we think will make the process of acquiring the necessary permits and approvals simpler, and the route's length, which is just long enough to take advantage of speed and short enough to allow us to reduce our capital costs at the outset.

Mr. **Glickman**. Mr. Benjamin.

Mr. **Benjamin**. Thank you.

Mr. Gilson, on your Los Angeles to San Diego proposal, what is the travel time now?

Mr. **Gilson**. The travel time, Mr. Benjamin, by conventional train is 2 hours and 40 minutes. By automobile it is 2 hours and 30 minutes and up, and I say and up because there is a big question mark based upon just the limited capacity of the highway.

By airline, the in-air time is about 40 minutes but I'd point out that the location of the airport in Los Angeles is such that you would have to take into account additional commuting time to the airport.

We expect that a high-speed train of the kind we are discussing here would operate between city centers in 59 minutes.

Mr. **Benjamin**. So it's about 40 percent of the present time on surface transportation by rail?

Mr. **Gilson**. Yes, sir.

Mr. **Benjamin**. What about the cost factor today? What is it by rail?

Mr. **Gilson**. It is $15 plus a fraction.

Mr. **Benjamin**. How much beyond that is the subsidy? So if there were no subsidy, what would the cost be?

Mr. **Gilson**. Well, Amtrak covers, this year, just slightly more than 50 percent of its operating costs from the fare box. So this is a little bit of a tricky calculation because it is hard to know how to impute the overhead costs to a specific route but the best I can say is that with the 50 percent revenue the cost ratio in a $15 and a fraction fare, you would get into a range of about double that.

Mr. **Benjamin**. So about $30 if there were not subsidy?

Mr. **Gilson**. Yes, sir; but I would not want to be held to the specific number.

Mr. **Benjamin**. We understand you are in the ball park, we assume.

How about if it were the high-speed rail in which you save 60 percent of the time, what would the cost be assuming there is no subsidy and you get our money at the marketplace and you have the sizeable investment by the Japanese?

Mr. **Gilson**. We currently are looking at fares which would be more than the conventional train fare, of course, and would be priced competitively with the current commercial air fare.

The current air fare range is $25 to $70, but the vast majority of the seats are sold in the $35 to $40 range.

So, again, we are talking about in round numbers here, of let's say a $25 to $30 end point, one-way bullet train fare.

Mr. Benjamin. So basically what you would do is you would compete with the fastest mode which is the aircraft and at less of a cost? Of course, you are just talking air time to surface time, 40 minutes to basically 60 minutes, assuming you are on time, as you normally are?

Mr. Gilson. Yes, sir.

Mr. Benjamin. That is interesting.

Now, incidentally, on your market studies now—and I don't know if they are complete—did this work out? It would seem attractive to me but is it attractive to those people who live out in the Los Angeles-San Diego area?

Mr. Gilson. Yes, sir. We have not quite completed the engineering and the marketing feasibility studies but they are close enough to completion that we are confident that they do demonstrate and will demonstrate to the satisfaction of potential investors that the economics work for Los Angeles to San Diego and that we will be able to cover our operating costs and handle all of the cost of money and retire the debt with an adequate remainder for return on investment, with the rough approximate service characteristics which I have described—a 59-minute downtown to downtown trip time and prices for the seats about as I mentioned.

I might mention further, if I may, that we are looking at 100 trains a day, 50 trains in each direction, with trains at roughly half-hour headways.

Now, the 59-minute trip that we are talking about is obviously a nonstop trip. We will expect to serve the intermediate markets with some skip-stop trains and with 50 trains a day each way there would be plenty of train service to accommodate the intermediate market which is a crucial market for us.

Mr. Benjamin. Is that a 24-hour-a-day operation?

Mr. Gilson. No, sir. We are looking for an early commuter rush hour start time and an end-of-the-day rush hour end time. By end of the day, I would mean 10 or 11 o'clock at night. We would not run trains overnight and we would expect to maintain the track overnight as well as the equipment.

Mr. Benjamin. What about the headway now?

Mr. Gilson. We have seven trains a day between Los Angeles and San Diego.

Mr. Benjamin. What type of traveler do you have in that corridor?

Mr. Gilson. I am not sure I can be precise on this but we do have a mix of the three basic elements of long-distance commuter which I would define as essentially Orange County and north rider and an Orange County and south in the morning and evenings as well as a significant tourist traffic, mainly to intermediate point destinations from the end points.

We have some business travelers, although with that trip time of 2 hours and 40 minutes I am speculating here but I think it falls more in the category of the two former types of riders than business as a dominant user.

Mr. **BENJAMIN**. You did not mention bus as a competitive mode. Is there bus service between these two communities?

Mr. **GILSON**. Yes, sir. There are between 50 and 70 buses a day. People tend to think that the comparison ought to be made with the airline because we are talking about a fast mode of transportation and surely we can't lose sight of the airline, but all other modes except the automobile represent a relatively minor share of the total market.

It is an automobile market today.

Mr. **BENJAMIN**. Do you happen to have the cost for the bus?

Mr. **GILSON**. I think it is a $10 fare.

Mr. **BENJAMIN**. It has generally been mentioned that this would be a $2 billion capital improvement project. You are assuming the right-of-way would be basically gratis, if I understand you correctly.

Mr. **GILSON**. Yes, sir. The route alinement that we are looking at essentially follows Route I-5. However, I-5 was, of course, not designed for this type of use so there are a lot of places where the curvitures and the grades are simply not suitable for a high-speed rail service.

But where it is suitable we would hope to use the I-5 right-of-way for this purpose and we have assumed that it would be available either at no cost or at a nominal cost.

Mr. **BENJAMIN**. Have there been conversations with the State as well as local government?

Mr. **GILSON**. Yes, sir. We have had extensive discussions directly with the Governor as well as with leaders of both parties in both the State assembly and the State senate and with local elected officials along the route and we are strongly encouraged to believe that when we know with precision which segments we will need in order to make this work that they would view favorably a request for gaining access to that.

Mr. **BENJAMIN**. Assuming, again, you are treated very fairly and that it is a dollar charge for your right-of-way or a very nominal charge, would you break down the major components of the $2 billion capital improvement cost?

Mr. **GILSON**. I can give you a rough measure but we have not received the final report yet from the Japanese team that is at work and I would want to have an opportunity to give you a refined version when we do have that available.

Of the $2 billion, and these are round numbers, we would expect that the combination of rolling stock and other things related to the rolling stock would represent about 10 percent or slightly less than 10 percent, perhaps.

Other large cost elements would include the contruction of the elevated concrete viaduct on which we would expect the train would operate over most of its route.

That would be necessary in order to make the maximum use of the most constrained right-of-way and also as a matter of safety, since obviously there can be no grade crossings with speeds up to 160 miles an hour.

So the combination of land acquisition and viaduct construction would be, perhaps together the single largest element.

Mr. **BENJAMIN**. What is the ball park percentage?

Mr. GILSON. Maybe about a third to one-half of the total. Let's say $1 billion.

We will require some tunneling and on a per-mile basis this is obviously the most expensive part of construction. The tunnelling will be in the neighborhood of $300 million.

We have an array of fixed facilities which would be required in the form of maintenance yards, maintenance of way and things, and these form the remainder of the costs.

Rather than try to assign numbers to these, I would rather have the chance to give you a percentage breakdown in a more meaningful way which I expect to be able to do within the next couple of weeks because by that time we will have a report from the Japanese team on which I could rely.

Mr. BENJAMIN. Well, let me ask you this. If I understand the scenario that is developing, the Japanese would be inclined to participate equity-wise about 25 percent of the total cost which would be about $300 million.

Yet, the technology that they would bring with them would represent about $200 million. So there is another $300 million that they are either contributing towards the construction, the tunneling or other aspects of it.

I know Japan is not a philanthropic institution, could you tell us why they are going to be so gracious? We should be grateful.

Mr. GILSON. I would be pleased to. First, I would say that we do not have unequivocal commitments for these funds. However, we have had extended discussions and we are confident that the funds will be forthcoming. We expect that the Japanese will invest either in the form of debt or equity substantially in excess of the export component from Japan and they will do this, in our opinion, because they will conclude, as they are already beginning to conclude, that this is a profitable project. They will make a business judgment that this is a supportable initiative in which they would want to participate as businessmen.

This is the basis on which we are approaching it.

We are not seeking decisions to be made by investors in the United States or elsewhere on a basis other than their own economic best judgment. That is why the project has to be supportable on the basis of the economics. And the indications are that the Japanese, at least at this juncture, are of the belief that this circumstance exists with regard to Los Angeles to San Diego.

We expect that of the $2 billion, roughly $1½ billion will come from the United States, the remainder from Japan. There could be some other foreign involvement. We don't want to foreclose that.

I should say further that we expect that the vast preponderance of well over a billion and a half dollars will be spent in the United States under the leadership of American construction and management firms and that the employment effect of this, in terms of direct employment for the railroad line itself, will be to create about 1,000 new permanent railroad jobs and between two and four thousand permanent new support positions, not directly railroad employees but connected with the railroad operation.

A further point would be that if the rule of thumb for highway construction pertains—the rule of thumb is that $1 billion of highway construction in the United States creates about 100,000 construction term jobs—I would expect between 150,000 and 200,000 construction period jobs.

Mr. **Benjamin**. I appreciate it and I think the significant figure—and I realize that we are just talking without the refinement of our figures, but in the ball park, certainly—is that out of that $2 billion anticipated cost, about three-quarters of it will be American construction, American work and perhaps American cement and perhaps some American steel, we hope.

But considering that even under the law we will participate with 80 percent of the Federal cost, we only require 50 percent and give a very minute preference to get 75 percent of the so-called business without any government contribution is a significant change of events for us.

I congratulate you for your presentation today, for your work on this project and your nurturing it.

As I explained, Mr. Goddard was known as the father of rocketry. You may be some day known as the father of the fast choo-choo. Thank you very much.

Mr. **Glickman**. Let me just ask you, have you already limited the technology for the Los Angeles-San Diego corridor to the bullet train, Shinkansen technology?

Mr. **Gilson**. Yes, sir. We do expect to use the Japanese technology and the reason for that is that we are convinced that we must have a proven technology that has worked, that has demonstrated its profitability in the marketplace over a period of time in order to attract the level of private investment which we think is preconditioned for this project.

The only place where all those conditions are met is with the Japanese technology as of today.

This is to take nothing away from the French technology or other technologies but they have not yet been in operation commercially long enough to satisfy a potential investor.

It is our hope that once the first system is built this will open up opportunities for a variety of technologies from various countries to enter the United States.

I would say that ultimately we would like to see an American technology which will be the world leader and we think that by taking this step we are going to help create the demand which will make that possible.

Mr. **Glickman**. So your next step after the Los Angeles-San Diego corridor, hypothetically might be a Miami-Orlando-Tampa corridor but you would not preclude any other technology for any of these potential corridors?

Mr. **Gilson**. I think the door is open for everybody once we have the first one underway.

Mr. **Glickman**. I was going to ask a question about what percentage of American products would be used. I think Mr. Benjamin went into that in great enough detail.

I have no further questions now.

I appreciate your testimony and look forward to watching some success in your venture.

Mr. **Gilson**. Thank you, Mr. Chairman.

Mr. **Glickman**. Since it is 10 minutes of 12, I think that what we might do is adjourn now until 1:15 to give us time to have some lunch.

We have basically all industry-related witnesses this afternoon so we will adjourn until 1:15.

[Whereupon, at 11:50 a.m., the subcommittee recessed, to reconvene at 1:15 p.m., the same day.]

AFTERNOON SESSION

Mr. **Glickman**. We will begin the last quarter of our hearings on advanced rail technology. I believe our first witness today is Mr. Jim Harp, with Northrop. Jim was one who kind of introduced me to the subject about a year or two ago. It is a pleasure to have you here, and welcome to the committee. I will let you proceed as you wish.

STATEMENT OF JAMES J. HARP, MANAGER, PROGRAM DEVELOPMENT, NORTHROP SERVICES, INC.

Mr. **Harp**. Mr. Chairman, my name is James J. Harp. I am manager, program development, systems management, Northrop Services, Inc.

Today, I am speaking on behalf of systems management, Northrop Services, a wholly owned subsidiary of Northrop Corp.

Mr. Chairman, we appreciate the opportunity to be here today to share with you our thoughts on advanced rail technology and the future of American transportation. This is a subject toward which we at NSI have directed significant resources over the past 2½ years. I have prepared a written statement and submitted it for the record. With your permission, I would like to present to you some of our thoughts in a brief oral presentation.

Much interest has been expressed here in the application of high-speed rail technology in meeting the passenger needs in high-density corridors. The future of American transportation is a much heavier subject. Indeed, the corridors approach is in my opinion another BandAid on a very much patched infrastructure. If we are to address the problems of the future and we accept the projections by both the congressional and executive studies plus the myriad of other literature on the future demands, then it is inescapable that, if we are not already, we will in the near future have our economic growth constrained by our transportation system. None of the proposals we have studied to date address this problem. Rather, we have single-mode initiatives that in aggregate do not provide for even a modest growth in economic activity through the year 2000. It is continual catch-up, with the Federal Government as the bailor. This incremental approach has, we believe, led to some very misleading conclusions regarding high-speed rail and electrification. Similarly, the Japanese and/or French technologies are not universally exportable. The geography, culture, and social elements of those countries are not those of the United States. Our problems, our geography, and society are unique, as are our requirements and capabilities. A macro view of our needs leads us to an entirely different view of the future.

We believe that the time and circumstances are right for a major new innovation in transportation. As uniquely American as our other institutions. One that will capture the imagination and use our capabilities to their fullest. In the technical jargon of the industrial innovation analysts we see the favorable congruence of demand pull and technological push forces. We see a demand pull situation in which the present transportation infrastructure is not adequate—nor can it be easily structured—to serve even the low-growth forecast for transportation requirements in the year 2000. We see a technology push situation characterized by proven foreign high-speed rail systems, as well as advances in communications, and transmission of electrical energy that have far reaching implications for our national logistics posture. To address this challenge we must remove the blinders of modal bias and look with a macro view at the problems, our present capabilities, and our resources. Then in the American tradition apply imaginative innovation and develop a solution that will recapture our leadership and satisfy our economic and strategic needs well into the next century.

What we propose is innovative and bold. It addresses the transportation problems as they have been identified and documented. It is geared to economic growth, and will add to that projected growth. It will enhance our strategic posture and add to the national and civil defense reservoir. It does not challenge the existing railroads as the heavy freight and bulk mover, nor the trucks in their sphere of efficiency. It relieves the existing rail structure of the passenger burden and the airlines of the inefficiencies inherent in the short haul. It is a new mode of transportation geared to long-haul, high-value goods and medium-range passenger service. It is high-speed rail—for passenger and intermodal—containerized freight. It is not nationalization, it is not subsidy in the traditional sense. It is positive geared to achieving a balanced system, and requires only facilitation by the Government.

What we propose is a national right-of-way network that would accommodate high-speed rail, communications, and utility needs. An interstate and defense system that could be amortized over a broad spectrum of the economy. This system represents a logical next step in the evolution of a national transportation policy and associated action plan. Such an initiative would complete the development of a balanced transportation infrastructure and facilitate more effective functioning of a free and open marketplace for the provision of transportation services. It would compliment and reinforce deregulation, and would stimulate more effective development of intermodal capabilities.

Our concept envisions legislation to facilitate the creation of an interstate and defense railway system of approximately 21,000 miles of dedicated totally electrified, high-speed roadbed, with state-of-the-art communications and control aimed at serving both passenger and high-value freight movement. The track system would be designed to accommodate speeds of 150–200 miles per hour utilizing to the maximum extent practical existing transportation or utility rights-of-way. The route location and alinement will be designed for a projected life of 100 years. The primary system would not enter urban areas, there would be no crossings at grade, and remote access would be by high-speed interchanges where such interchanges are economically justified. Transfer facilities would be at 250–500 mile intervals, with some exceptions dictated by population, major ports, and communications centers. Electrification of the primary system allows for the use of the most available and economic source of energy into the 21st century. Where necessary electrical generating facilities would be constructed and/or expanded to satisfy system needs. With the developing high-efficiency transmission technology and the system right-of-way, there should be a minimum requirement for such construction. Communications and control will require the use of state-of-the-art sensors and automation to achieve the highest levels of safety and operating efficiency. Emphasis on intermodality is essential, and the design would incorporate high-speed passenger and containerized freight.

To build, operate, maintain, control, and insure rights of access to such a system will require a unique organization and management structure. We believe a publicly chartered, private corporation—a Comsat type of structure.

Funding of such a major program is, we believe, possible through the private sector. Our economic investigation to date indicates with realistic estimates of loading this system could generate $20 million to $30 billion of revenue per year by the year 2000.

The long-term and near-term benefits of the system we call "Rail America" are significant:

Up to 1 million jobs in the construction, operation, and maintenance of the system throughout the construction phase, with obvious follow-on;

Positive environmental and energy impacts;

Commercial and strategic alternative to the Panama Canal;

Increased productivity and industrial revitalization; and

Vital enhancement of our defense posture and reduction of time in meeting our worldwide strategic commitments.

We have discussed the Rail America concept with a significant number of thought leaders in Government and industry. The consensus reaction is that Rail America or something like it must happen. A congressional charter is the vehicle necessary to move ahead. Northrop Services and our affiliate team members stand ready to provide the inputs necessary to develop a planning structure for that first crucial step—the charter. There have been few moments in history when so many essential elements necesary for an innovation of this magnitude have been in place. I firmly believe that the necessary political, social, and environmental ingredients are present. Our economy needs a catalyst, the technology is here, the time is now. What is needed is the leadership, and the bold decision to move ahead to the 21st century.

As I look around this room at the walls I have difficulty in accepting those who express the negatives of such a program. We can do it, do it better, we can do it now, we must do it now if we are to maintain reasonable levels of growth in the future.

I echo Congressman Reuss's words of a need for pride, revitalization, and a national program as a catalyst.

In closing, let me again thank you, Mr. Chairman, and the members of the committee and you, Congressman Benjamin, for this opportunity of being here.

[The prepared statement of James J. Harp follows:]

TESTIMONY OF
JAMES J. HARP
MANAGER, PROGRAM DEVELOPMENT
NORTHROP SERVICES, INC.
ON BEHALF OF SYSTEMS MANAGEMENT, NORTHROP SERVICES, INC.

INTRODUCTION

Transportation is an integral part of the U.S. economy, accounting for well over 10 percent of our gross national product. Nearly 12 percent of the nation's jobs are in transportation or related industries. Over 25 percent of the total domestic energy consumption and half of the domestic petroleum consumption is attributable to transportation demands. An effective transportation system is essential to the health and welfare of our economy. But our transportation system is ailing, and the prognosis is not good.

Demand for freight and passenger service continues to increase, but overall capacity and productivity are not keeping pace. All of the transportation modes - air, water, highway, and rail - operate with many locations frequently at or above their design capacity. Significant portions of the system need repair or reconstruction. This situation is not particularly recent nor has it gone unnoticed. Nevertheless, most proposed solutions address the problems symptomatically and at least offer abatement only through the 1980's. They cannot lead to effective integration of the national transportation system nor provide dramatic improvements in its productivity.

Transportation is second only to energy in the magnitude of its effect on the economy of the nation. Even the energy crisis is exacerbated by the transportation system - by its inefficient use of energy products and by its inability to redistribute available resources efficiently. The net result is simple; the economy of the United States is rapidly becoming transportation-constrained.

The currently planned modifications to the transportation system will not be sufficient to correct its basic shortcomings. Further, the need is great and the time is right for a bold new initiative. We offer an approach called "Rail America" that uses advanced rail technology but goes beyond rail to offer a national network for the transportation, communication and utility needs of the nation well into the next century - an approach that rejects nationalization while providing for the future of American transportation. The central element of our concept is an interstate and defense right-of-way network with the following progressive characteristics:

- A 21,000 mile grid of new, high-quality roadbed and alignment suitable for high-speed operation.
- Electrification for energy efficiency.
- A modern communication and control system to provide high-volume, high-speed, safe movement of goods and people.
- Emphasis on containerization and intermodal operations for both freight and passengers.
- Management by a public corporation or authority.
- A system that has the flexibility to meet the nation's transportation needs well into the next century.

This paper outlines the transportation predicament, identifies rail as the most cost-effective focus for a major effort to revitalize the transportation system, and presents further details on the Rail America concept and its potential impact on the nation. This approach would place the Federal Government in the role of the facilitator, not the owner nor the subsidizer. We are seeking support for a full-scale, comprehensive effort to further develop the concept, to assess the costs, benefits and risks, and to prepare a viable implementation plan.

THE TRANSPORTATION PREDICAMENT

The transportation system in the United States is inextricably linked to a wide range of general public concerns:

- Energy security
- Efficiency and effectiveness of public services
- Inflation
- Urban revitalization
- Industrial productivity
- Support of space initiatives
- Personal mobility
- Promotion of domestic industries
- Protection of the environment
- Public safety
- National defense
- Civil disasters

Recent government studies and efforts to develop national policy positions document these concerns. Current national objectives being broadly advocated are to increase productivity, to maintain and rebuild physical and industrial plants, and to conserve resources. For transportation, in particular, government reports repeatedly emphasize the goal of achieving a "balanced" transportation system in which the inherent efficiencies of each mode are fostered. The Department of Transportation is insisting that new policies or programs rely on market mechanisms wherever possible and reflect a balance between consideration for the long view and the need for immediate action. All of these public and policy concerns must be recognized and dealt with in any serious discussion of transportation, its ills, and proposals for its improvement.

The United States has the world's most extensive system of highways, the largest automobile and truck fleets, the most elaborate system of air traffic control, and the greatest fleet of aircraft. In addition, we have an extensive canal and inland water system. We are building some of the world's most modern urban mass transit networks. Yet, we do not have an effective, integrated transportation system.

Efficiency and effectiveness of the total system are being seriously questioned. Although the transportation industry had a respectable 2.9 percent rate of productivity growth between 1965 and 1973, this rate fell to 0.9 percent during the period from 1973 to 1978. Return on investment for the rail industry has been consistently below industrial norms for over 20 years. Recent military preparedness exercises have demonstrated that our transportation system is woefully inadequate to meet the capacity and speed requirements for strategic movement of men, equipment, and supplies.

Forecasts are even more disheartening. Unless there are massive investments in maintenance and capacity expansion by 1990 there will be at least 15 constraining locks on the inland waterways, and nearly a third of the commercial air-carrier airports will have reached saturation. Interstate highway systems will be operating at nearly 150 percent of design capacity in 27 states, with at least 47 of the contiguous states having some of these rural systems beyond design capacity. Increased movement of coal will increasingly choke our ports and segments of the rail system and interfere with the flow of other commodities.

Historically, regulated intermodal competition has kept the modes uncoupled and has led to suboptimization system wide. Following this legacy, current actions or plans aim primarily at improving maintenance or upgrading capacity within individual modes. Vast sums of money may be spent in this manner without significantly enhancing intermodal linkages. Without effective interrelationships among the transportation modes, we can expect inefficiencies and congestion to continue.

Government agencies, industry, and academics are unanimous in sounding the alarm. The transportation needs of the nation are not being adequately met now, and the situation is likely to get worse if we follow "business as usual." There is a recognized need for action, but no clear consensus on exactly what should be done to create an efficient, effective, balanced transportation system.

RAIL PROBLEMS AND POTENTIAL

Except for rail, the general purpose transportation modes--air, water, and highway--are working at or near their current physical capacity or control limits. Though rail has its own peculiar set of problems and much of its physical plant is in a deteriorating state, for the most part it is operating far below its physical and technical limits. Close examination reveals that rail mode offers a cost-effective focus for a major effort to significantly expand the capacity and overall service characteristics of the total transportation system.

Rail is an energy-efficient transportation mode especially suited to long-distance and bulk transport of commodities. It is also an efficient and potentially competitive option for short- and intermediate-range passenger travel. Nevertheless, the railroads have steadily lost market share for both passenger and freight traffic since the 1920's, except for a brief surge during World War II.

During the period from 1947 to 1977, the real GNP grew by 185 percent, industrial productivity by 250 percent, and tons of intercity freight by 91 percent. In this same period the ton-miles of freight movement by truck increased 450 percent, by oil pipeline 433 percent, and by inland barge 700 percent. Ton-miles moved by rail, however, increased by only 25 percent. From 1963 to 1972, rail movement of fabricated metal products dropped from 41 percent of the market to 23 percent. From 1970 to 1977, rail movement of fresh fruit and vegetables dropped from 31 percent of the market to 11 percent.

The major causes for this decline are broadly recognized and have been summarized by the Department of Transportation:

- Changes in the nature of the freight transportation market and increasing competition from other modes.
- Government regulation of the railroads and subsidy of competing modes.
- Structure of the railroad industry and labor-management relations.

These general causes give rise to specific problems which are frequently cited:

- The average scheduled speed of a freight train is 20 miles per hour; for a passenger train it is 46 miles per hour. Significant improvements in these speeds are technologically achievable.
- The lack of reliability for rail freight and passenger service is accepted within the industry as inevitable. Speed and reliability are both degraded by inefficient terminals and substandard physical plant.
- The industry requires high capitalization but experiences low equipment utilization. The inventory of 1.6 million freight cars has a 12 percent utilization rate.

- Much equipment and many operating procedures are technologically obsolete. Failure to innovate has led to loss of market share in transporting many commodities.
- There will be a shortfall of $13 to $16 billion in the railroads' ability to raise needed capital over the next decade. There is already a backlog of deferred maintenance and capital improvements that exceeds $6 billion.

Actions are being taken to deal with some of these problems. Deregulation will provide increased revenues and result in the railroads' becoming financially stronger. Mergers also will enhance the financial base of the fewer remaining companies. When placed in context of the requirements of the year 2000, however, there is a serious question as to whether these financial gains will be sufficient. Further, there is little in either the deregulation or merger approach that will guarantee improvements in rail productivity or facilitate aggressive movement toward a more integrated transportation system.

The railroads have shown that under the right conditions they can innovate and regain market share. Through technical innovations in rolling stock and car loading procedures, the railroads' share of the market in moving finished automobiles rebounded from a low of 8 percent in 1959 to over 50 percent currently. In terms of energy and economic efficiency, it is in the national interest to divert some of the projected growth in transportation demand back to the railroads. To do this, however, it must be possible and economically attractive for the railroads to innovate.

Analysis of the problems and potential of rail leads us to conclude that the industry cannot achieve its full potential with its own resources and with "business as usual." In the search for capital to finance maintenance, upgrading, and capacity expansion, railroads are unfairly hampered by history, the current regulatory regime, and current practices. Of all the general-purpose modes, only rail must provide its own rights-of-way and control systems. In the United States the door-to-door average speed for delivery of freight including all modes, is less than 7 miles per hour. Rail traffic door-to-door averages 4 miles per hour.

Productivity of the railroads must - and we believe can - increase by an order of magnitude. Any extensive modifications to the rail system, however, should support and promote development of a truly integrated transportation system, one that can capitalize on the inherent capabilities and efficiencies of each mode.

RAIL AMERICA:
A BOLD NEW INITIATIVE

Rail America represents a logical next step in the evolution of a national transportation policy and associated action plan. Its physical configuration requires a new public initiative; provision of a national network of high-speed interstate and defense rail right-of-way and roadbed. Such a move would complete the development of a balanced transportation infrastructure and facilitate more effective functioning of a free and open marketplace for the provision of transportation services. It also would complement and reinforce deregulation and restructuring initiatives and would stimulate more effective development of intermodal capabilities. A compatible institutional framework for Rail America is incorporated in the overall system concept. Appropriate organization, funding, and management functions will be provided throughout the major phases of the project - from conceptualization and preliminary design, through construction and phase-in, to full-scale operation, maintenance and upgrade.

The railroads appear to be the weakest link in the transportation system at this time. We propose a re-examination of some of the rail-oriented issues from the perspective of the total transportation industry and national policy and needs, rather than from the viewpoint of how railroads operate today. Specifically, we propose the construction of a "national interstate and defense rail system" with specified characteristics.

STRUCTURE AND OPERATIONS

Rail America consists of a transcontinental network of approximately 21,000 miles of dedicated, high-speed, totally electrified railbed, with state-of-the-art communications and control, aimed at serving both passenger and freight movement. The essential physical and operational features of the system are detailed below.

System route. The route location and alignment will be designed for a projected life of 100 years. Selection of nodes and corridors will be based on economic requirements and projected transportation demand. National and regional development plans and policies will also be considered. Adequate provisions will be made for expansion so that future costs will be minimized, a lesson that should not have to be relearned after our highway experiences these past three decades.

Urban and regional interface. The primary system would not enter urban areas. Station, terminal, and interchange facilities would be located beyond the beltways of the interstate highway system. There would be no crossing at grade, and remote access to and from the primary system would be via high-speed interchanges where such nodes were economically justifiable. Recognizing that the source of many current delays and losses is in terminal and interchange operations, design of station and freight handling facilities would place emphasis on automation and would support and encourage intermodal freight and automobile/passenger service. Transfer facilities would be located 250 to 500 miles apart, with some exceptions dictated by population and major port/communication centers.

Electrification. The system would include total electrification of the primary network to allow use of the most available and economic energy sources (e.g., coal, hydroelectric, nuclear, geothermal, solar) into the 21st century. There is some concern about electrification and the reliability of the generating and distribution network, particularly from a defense standpoint. Redundancy and hardening for defense purposes can and must certainly be considerations in design. As we look to the future, uncertainties in the availability and cost of petroleum-based fuel may well override the less attractive features of electrification.

Electric generating facilities. If necessary, electric generating facilities could be constructed as an integral part of the system to ensure adequacy and efficiency. Wherever possible, such facilities would be constructed at the energy source (i.e., at the coal mine), with modern high-efficiency transmission techniques employed. Initial evaluation indicates a minimal requirement for such construction.

Communications and control. Communications and control will utilize state-of-the-art sensors, signaling and automation to achieve optimal efficiency in movement and the highest level of safety and security on the network.

Prototype systems with the capability to handle Rail America's projected performance characteristics are already operating in Europe and Japan. Some advanced components are also operating on a few segments of the U.S. network.

Operations on the Rail America network will emphasize container, auto, and passenger service, but Rail America will not operate its own commercial rolling stock. Access to the Rail America system will be guaranteed for any operator with equipment that meets system performance and safety requirements. Existing rail, air, water, and highway networks, and related industries will continue to function as feeders and for gathering and distribution purposes. Existing railroads with extensive track systems would have the option of running their equipment on their own track or, where economically or operationally preferable, on segments of Rail America. Speed, reliability, safety, and service will be the performance goals of the system.

Conventional railroad wisdom dictates that passengers and freight should not be mixed on a high-speed network. Indeed, the French and Japanese high-speed systems are exclusively for passengers. The available information indicates that this is due to the high utilization of these structures rather than an inability to design a system that could handle both passenger and intermodal freight traffic. British rail experience, with light freight trains moving at 75 mph, suggests that mixed service is in fact feasible. By designing a system to accommodate both passenger trains and short trains of containerized freight, we believe those conditions can be met on Rail America.

Emphasis on intermodality is essential. Rail America will rely on existing rail and the truck for the 250-mile radius distribution and freight collection requirements. It will feed the ocean and river ports and will enhance profitability of the existing rail, air, and truck industries by allowing each of the modes to blend into a national transportation network capitalizing on the inherent efficiencies of each. The existing railroads will continue to handle those commodities and markets they presently serve.

ORGANIZATION, FUNDING, AND MANAGEMENT STRATEGIES

The basic institutional framework will provide for an organizational structure, a funding mechanism, and operational guidelines stressing intermodalism. Complex political and legal issues are associated with the specification of institutional forms. Although careful study, analysis, and debate will be required to settle the fine points, the broad outlines of the preferred framework can be laid out at this time.

A national authority would be created to construct, maintain, and provide control of the system, and to ensure rights of access by industry within the operating and safety parameters necessitated by the speed and operational characteristics of the system. The authority could take any one of a number of different forms, including a private corporation chartered by Act of Congress (along the lines of Comsat), a government corporation, a cooperative equitably owned by its users, or an independent government agency.

Initial investigation of the concept indicates the public charter of a private corporation, a "Comsat," is worthy of very close examination. It would, as would any alternative, require congressional action to provide a Charter and initial loan guarantees to keep interest rates down. Those guarantees should only be required until such time as revenue service is begun.

As a separate effort, urban and regional transit systems should be extended and/or introduced to ensure integration of systems for the efficient movement of people. Reducing access time to the network from urban areas would further reduce overall trip time and stimulate passenger service for intermediate range (250 to 1000 mile) trips. It is further anticipated that increased marketability of rail service will heighten interest on the part of investors and lead to rationalization and improvement of urban terminal infrastructure.

BUSINESS AND ECONOMIC ANALYSIS

The capabilities and service regime of the Rail America high-speed rail system focuses on segments of the transportation market that cannot be served more efficiently by any of the existing transportation modes. For passengers on trips between 200 and 1000 miles, Rail America will offer economic and service characteristics that will be superior to any other modes. On hauls over 500 miles with commodities valued in excess of $600 per ton, containerized movement on Rail America will be the preferred shipping mode. A preliminary market analysis (conducted by our consultants) shows that by the year 2000 the Rail America system could be generating $20 to $30 billion dollars per year in income just from these two market segments.

The total cost to construct the Rail America system is difficult to estimate at this stage of concept development. However, the following cost elements should be representative:

Design and construction of track and support structure

21,000 miles @ $12 million/mile = $252 billion

Terminals

50 @ $50 million each = $2.5 billion

The annual maintenance and operating costs could be in the neighborhood of $13 billion per year (approximately 5% of capitalinvestment). The material and equipment requirements to build and develop full operational capabilities of the system are estimated as:

Steel and iron (@ 2000 tons/mi.) = 42 million tons
Concrete (1 million cu. ft./mi.) = 21 billion cu. ft.
New rolling stock (est.) = $100 billion

Over the twenty to thirty year construction period direct employment should be in the neighborhood of 200,000 person-years/year. Two or three times this number of jobs may be created in secondary supply and service sectors. At full operation, the Rail America system should create at least 100,000 new, permanent jobs.

By blanketing the country with a network of high-performance readily accessible railbed, by directly stimulating an inadequately served demand sector, and by bringing this country's unused heavy construction capacity back into service, the implementation of the Rail America system could serve to kick the U.S. economy off the "medium growth" curve and onto the "high growth" curve. This additional 1% growth rate in GNP translates into a potential $20 billion per year. This impact would be spread throughout the economy, but would be felt most strongly in the transportation, construction and related machinery industries, in the associated hotel, food, and transportation service industries, and in industrial materials handling and distribution equipment and services. Co-utilization of the right-of-way would stimualte developments in:

- fiber optic communications
- cryogenic power transmission

- transcontinental free trade zones (the so-called "land bridges" between the European and Far East markets)
- defense and mobilization capabilities

SYSTEM SYNTHESIS

Putting it all together, Rail America is a new rail-oriented system that has been motivated by a concern for improving performance of the total transportation system. It is much more than just a rail network. It has been conceived, in a "whole system" sense, as an integral part of the intertwined physical, economic, and social fabric of the country. It can be an essential first step in a long-range plan for revitalizing or stimulating innovation in American industry.

Significant technology and innovation is now held in check for lack of right-of-way. Such major programs include fiber optic and cryogenic transmission of electricalenergy. The network of national corridors constructed for the Rail America system would provide the base upon which to develop these other vital capabilities. The ability to amortize the significant investments required is clearly an achievable goal when viewed in this macro environment of national logistics and the creation of a national resource.

The design and operation of the Rail America componetns will be responsive to social, political, economic and technical environment forces and will provide or facilitate improvements in service characteristics of the total transportation system. For the existing rail network, Rail America can have a positive impact through its emphasis on better utilization of existing rail technologies and on making the railroads truly competitive with other modes.

Impacts can be identified and assessed throughout the implementation and operational life cycle of the system. They will be positive overall.

Considerable detail has been presented here in order to give focus and specificity to the Rail America concept. Obviously more development will be required to confirm the feasibility of the concept and to suggest revisions or refinements. Nevertheless, the overall concept is compelling, and perhaps even essential, as a way to breath new life into the nation's transportation system. In the next section we offer a preliminary assessment of the projected impacts of Rail America.

IMPLICATIONS FOR THE NATION

Rail America would be a shared right-of-way with limited access and egress points and stations. High-speed through-trains of containerized freight or of passengers - perhaps with their automobiles accompanying them - will enter and leave the system as dictated by private sector determination of transportation options and economics.

The system would be essentially intermodal, combining the flexibility and efficiencies of the motor carrier or the short-haul railroad as collector, feeder, and deliverer, with the high speed and reliability of state-of-the-art line-haul rail transportation. It would also combine the flexibility and efficiency of container units to facilitate loading, transhipping, and delivery, with the efficiency of short through-trains to eliminate delays in marshalling and transit time.

Air transportation already provides an efficient high-speed, long-haul capability for passenger service, complemented by the convenient and economical short-trip service offered by automobiles. For distances in between, however, the railroad can offer a service that is much faster than the automobile and not so much faster than the automobile and not so much slower point-to-point than air transportation. It is therefore, competitive at a significant price differential. For passengers accompanied by their automobiles, the railroad would have unique advantages even over long distances.

From the point of view of national transportation policy, this use of railroad transportation would improve the productivity of the entire system. Railroads would be assigned tasks for which they are uniquely efficient. Critical inefficiencies and congestion in other modes would be relieved.

Projected increases in total freight tonnage and in size of highway carriers indicate that both the federal and the interstate highway system will be overtaxed in capacity and in maintenance in coming decades. To the extent that more efficient railroads can attract a significant part of the increased medium to long-range traffic, highways and highway carriers will be more efficient as a consequence.

In passenger transportation, both highways and airways are already overcrowded, especially around the population centers that are the large traffic generators. Use of railroads for intermediate distances will relieve much of the airway and airport delay and danger, as well as highway congestion at peak traffic times.

The projected timeframe for implementation of Rail America would allow for an evolutionary transformation. There can be a gradual and economic development of full capability in passenger, container, and automobile movement as the level of operational capability and efficiency builds up during the implementation cycle. The age and projected life of existing rail rolling stock allows for effective amortization of the current investment and introduction of new passenger and intermodal rolling stock capable of moving on the Rail America network as the construction phases are brought to completion.

Containers would move on flatcars designed for high speed and constructed to minimize aerodynamic drag. This equipment could be owned or leased by the private entities using the system. Ultimately, the productive utilization of rolling stock of the railroad industry could approach 85 percent (a utilization factor for containers claimed by at least one major maritime operator) compared to the current average of 12 percent. Container leasing firms could provide the basic box for loading, unloading, and temporary holding of goods and products. The overall goal is high performance and high-capacity trunk lines, with one-day transit of the country for containers.

Electrification will take us into the 21st century with only the source of energy changing - i.e., coal, hydroelectric, nuclear, synthetic fuels, solar or any other evolving form. It also allows for long-range planning to place the generating facility as close to the source of energy as possible, using advance transmission systems to more efficiently move the electricity rather than source fuels.

By imaginative design of the roadbed an electromagnetically shielded vault would provide the necessary channel through which the communications, control and power distribution for the high-speed rail would be facilitated. Expansion of this vault could also provide the necessary channels for a national command and control system fibre optic cabling and the ability to initiate the deployment of the cryogenic transmission systems that will permit the efficient movement of electrical energy throughout the United States. This secure system will provide environmentally protected, strategically secure energy, communication and transportation links throughout the United States.

If rail freight transportation were faster and more reliable, more goods would move by rail. Since rail transportation is inherently lower in cost, such a shift would reduce transportation costs in the aggregate. If transportation costs were reduced, there would be a tendency for transportation rates to be lower. Thus, benefits of lower costs would flow through to shippers and consumers in the form of lower prices.

Faster speeds and turnaround would increase rates of equipment utilization and increase the productivity of capital. Direct service and efficiency of transshipment would increase the productivity of labor.

In addition to direct savings in transportation costs, Rail America would yield further savings derived from speed and reliability. With lower transit time and faster deliveries, inventories would be smaller, both becasue of reduced "boxcar inventory" and because business could safely reduce warehoused inventories since delivery time would be shorter. Considering the cost of money tied to inventories, smaller inventories mean significantly lower costs. It can be expected that breakage and spoilage during transit also would be less. These indirect savings are among the important prospective economic benefits of Rail America.

Another economic benefit would be derived from the shift from air and highway passenger transportation to rail, since for a large range of route segments rail is more economical than air. The total resources employed - capital, labor, and especially energy - would be substantially less, and the economy would benefit accordingly.

In addition to the impacts of Rail America on the transportation system and its users, putting the project in place will stimulate sectors of the economy that supply or support construction services and equipment. In the economic accounting of the system. the expenditures for building and equipping the project are costs to be offset by the benefits. However, the stimulating effects on the economy will provide jobs and markets in heavy construction and heavy equipment manufacturing. This will generate additional incomes and secondary benefits.

Construction activities associated with Rail America will provide a stimulus to manufacturing and equipment, mining, primary metals, plastics, construction trades, and the petroleum industry. There may also be a stimulus to the timber industry as well as other sectors of the economy such as communications, financial, insurance, engineering, and engineering systems services.

In operation, Rail America will have an overall positive impact on efficiency and productivity, and a consequent positive impact on the rate of growth of the GNP. In the process of intermodal shifts and changes in competitive relationships, however, there may be losers as well as those who gain from the ensuing income redistribution. There may also be some restructuring required in some industries. However, because of the extended period for development and implementation of Rail America, such restructuring can be expected to occur gradually in response to natural market forces. Nevertheless, special attention may have to be given to short-term impacts on existing railway systems, many of which are financially healthy and should be preserved as trunk route and feeder line operators.

The U.S. competitive position in international trade could be improved as a result of increased transportation efficiency. Increase in foreign investment could be expected. There could be some adjustment patterns, with increases in exports and high technology and increases in imports of labor-intensive finished goods. Specifically, there could be an increase in U.S. marketing of rail products. Increased intermodal shipping would also stimulate port activities and development of supporting technology and related industries.

Rail America also would make possible the creation of a transcontinental trade zone that would provide an alternative to use of the Panama Canal for most commodities. This "land bridge" alternative is in use to a limited extent already and is rapidly becoming an economic necessity. Such a zone provides a channel for the flow of commerce between Europe, the Far East, and North and Central America. This capability is particularly significant when placed in the context of population and market projections of the Global 2000 Report.

Land-use patterns and urban development will be influenced by the location of intermodal transfer points. There will be an increase in land values and, therefore, in the intensity of and use near intermodal transfer points. Increases in population in these areas could be expected and even new "mini-cities" might appear. Using existing rights-of-way to the extent practicable and avoiding major urban areas with the main network would minimize the negative impact of devoting the required quantities of land to rights-of-way and buffer zones. Location of network nodes and access points should be carefully selected with this in mind.

There will be significant influences on labor patterns and opportunities both during and after construction. The construction phase of the interstate and defense rail network will create in direct and induced requirements an estimated 600,000 - 800,000 jobs. The electrification and communications and control network will create significant demand for skilled labor. The induced labor in supporting industries clearly will be significant and will continue well into the next century.

Existing labor agreements within the railroad industry are the product of a shrinking industry and the need for job security. The expansion of the industry will open the way for realignment of work rules so that the labor force can enjoy the same benefits and satisfaction as workers in sister industries. The engineer/crew of the train could be viewed in the same light as the pilot/crew of the aircraft.

There will be energy impacts both through modification of the demand patterns of the transportation modes themselves as well as through enhanced ability to move energy resources. Though the share of oil currently used by the railroads is a relatively small portion of the national total, it is nonetheless significant. Electrification of the primary system should reduce that demand by about 20 percent. In addition, the eventual upgrade and electrification of the high-density private rail lines could generate equal or greater savings. Great potential savings accrue from the ability to handle containers with greater efficiency and reliability, and from the institution of fast, reliable, safe, and efficient passenger/automobile service. A conservative estimate of initial savings once these services become available is in excess of 200 million barrels of fuel per year. Of equal importance is the development of a basic transportation system that can utilize the most available and economic fuels through the next century by relatively simple adaptation of generating facilities.

Extensive new rail and barge lines are being proposed to meet the nation's needs for coal movement. Relieving the railroads of the major burden of providing and maintaining a high-quality, general-purpose main-line national network could free up capital to support more specialized route structures and roadbed.

The military and strategic importance of the Rail America system will be significant. Our present ability to move military personnel and equipment is severely constrained. Rail America would greatly improve strategic response time. The primary demand of the defense establishment is evolving toward rail flat cars to move both equipment and containerized material. This demand is dictated by the characteristics of available shipping and by the inherent efficiency of containerization for the warehousing, storage, and movement of military supplies. Rail America will facilitate the long-range planning of military base infrastructure, thereby easing strategic constraints on the movement of materials and equipment throughout the nation. The reduction of the "wet" time in the movement to reinforce NATO, or for that matter in support of our global commitments, would significantly reduce exposure of shipping to interdiction. Our strategic posture will be greatly enhanced and it will provide for our national independence from the Panama Canal.

CONCLUSION

Rail America embodies elements and concepts that have been proposed and analyzed before. Our approach integrates a particular set of elements and brings into focus a conceptual framework that we believe merits special attention and consideration. It appears to be a logical and feasible next step in the development of our national transportation system.

Many studies have been conducted over the past decade focusing on the problems of the railroads and of transportation in general. Broad-based studies of the entire transportation system have identified general issues and proposed guidelines and direction for policy. Detailed technical and economic studies have been performed on specific modes, components, or proposed actions. Many good ideas (broadscale electrification, for example) have thus far been rejected because of the lack of a suitable framework within which to adequately evaluate their impact or feasibility.

So far, we have found no study that (a) places emphasis on transportation as the cornerstone of commerce and economic development, (b) lays out the capacity and service requirements for a totally integrated transportation system, and then (c) translates requirements into the specifications for a major change in infrastructure. In our conceptual approach, we have considered all three of these things. We have examined broad national goals, national transportation requirements, and the inherent capabilities and limitations of each transportation mode. We feel that our concept addresses these important considerations in a positive manner. We have identified problems and shortfalls in the current modes of transportation and have studied most carefully those associated with the railroads. All of our initial evaluations have been positive and have led us to the conclusion that the concept of a national corridor is workable and significant. The approach is both bold and innovative, and the potential impacts are of such magnitude that further detailed analysis seem warranted. In essence, what we propose is a new mode.

As we have attempted to show above, Rail America offers prospects of great value to the country and its economy. For this reason, the underlying propositions need to be further carefully tested for feasibility: Will it work, and will it pay off?

Technical Feasibility. Can we economically exploit the state-of-the-art to permit sustained, high-volume railroad operations at 150 to 200 miles an hour? Can the experience with high-speed rail in Europe and Japan be duplicated or improved for both passengers and freight in the United States?

Institutional Feasibility. Can we devise a politically acceptable institutional base and format for the establishment, governance and functioning of a publicly owned and controlled right-of-way accessible to all users? Can impacts on existing carriers be channeled in a manner that will ultimately be to their benefit?

Financial Feasibility. How much will it cost, and how will the money be raised? Can it be made self-supporting without imposing excessive charges on users or distorting intermodal relationships in the transportation sector? What modes of financing are available and how would they affect public and private financing?

Economic Feasibility. What will be the economic cost (use of economic resources) and economic benefits (increased productivity and efficiency) of the project? What are the marginal costs and benefits of increased speed? Would the benefits be comparable for similar investments in alternative strategies, such as (a) continued incremental patching (business as usual), or (b) a massive upgrade of conventional railroading?

Legal Feasibility. What procedures will be used to permit use or transfer or permit the acquisition of rights-of-way for a national corridor and to establish it as an effective component of our national transportation system? How will this new system be integrated into the existing fraemwork with respect to matters such as rates, the commencement and abandonment of service, safety standards, and labor relations? What environmental restrictions will have to be taken in account before such a system can be established? To what extent will constraints arising from various Federal and state laws and regulations present hurdles to the establishment of a national corridor?

In our continuing efforts to explore these issues an exceptionally competent team has been brought together. The team is multidisciplinary, contains firms with national and international repute that cannot be associated with any particular transportation modal biases. At the same time, there is a balance of experience in aviation, highway, waterway, port, and railroad analysis and engineering as well as significant experience in making economic, environmental, and social forecasts and impact assessments.

Our team is composed of Northrop Services, Inc. - serving as lead organization to provide operational analysis, systems integration, and project management - and the following team members:

- R. R. Nathan Associates - to provide economic forecasts and analysis
- Greiner Engineering Sciences, Inc. - to provide engineering design and analysis and environmental impact assessment.
- R. L. Banks & Associates, Inc. - to provide analysis of contemporary railroad operations, procedures, and institutional arrangements
- The Futures Group, Inc. - to provide socio-political forecasts and impact assessments.
- The law firm of Pierson, Semmes, Crolius and Finley - to provide legal and institutional analysis in addition to evaluating the legal feasibility of other elements of the concept.

In addition to the team members, we have engaged the services of a number of individual consultants who are recognized for their expertise and imagination in transportation, safety, energy, communication, and signalling.

We believe that this team represents a competent and proper mix of disciplines and organizations to conduct the necessary analysis and develop the necessary plans. Team members were chosen because of their recognized contributions at the national and international level and their ability to deal creatively with broad systemic concerns without becoming bogged down with details or blinded by conventional practices.

Over the past two and a half years, the affiliated team members have invested their own resources in the development of the concept. A considerable base of data and analyses have been assembled. Appropriate institutional sponsorship and additional funding are required to proceed further.

A careful and systematic effort must be undertaken to further explore the feasibility questions raised above. The specific goals of the analysis should be as follows:

a. Confirm technical feasibility by establishing preliminary design concepts for critical components.

b. Develop estimates of construction, operation, and maintenance costs and schedules.

c. Establish economic practicability and evaluate financing alternatives.

d. Analyze the extent to which the current legal framework is suitable for such a dramatic addition to the existing transportation system and identify changes that would be necessary or desirable for implementation.

e. Identify the benefits and risks in the areas of labor, environment, safety, energy, economy, defense, institutions, and regional development.

f. Modify the concept to incorporate insights gained in the course of the above analysis.

g. Devise an implementation plan that would include: (1) proposed legislation, (2) management and organizational structure, (3) financing alternatives and scheduling, and (4) an educational program to program to provide accurate information to the public, industry, labor, and governmental groups.

What is required is sponsorship from the national leadership and the necessary charter or commission to complete the concept validation and develop a viable implementation plan so that the necessary hearings could be undertaken and positive action taken to move our nation into economic health in the next century.

Mr. **Glickman**. Thank you, Jim, give me some idea of what you would foresee authorizing legislation by Congress to look like. You say we have to do something here.

Mr. **Harp**. I think it is a two-part answer to your question, Mr. Chairman. I think the first thing we have to do is do the necessary concept validation work and develop that structure of a charter. We would see that perhaps taking the best part of a year at least. And then using that as the basis, then develop the necessary legislation for the charter and move ahead into an implementation plan. That would perhaps take another year to finish the implementation plan.

Mr. **Glickman**. The charter would be a charter for a Comsat-type corporation?

Mr. **Harp**. As we see it now; yes, sir.

Mr. **Glickman**. How would existing railroads interface with that type of corporation?

Mr. **Harp**. We have to recognize this is a new mode. The existing railroads in fact are freight movers. They want to be freight movers, if I understand their testimony that we have read over the years. The passenger is a burden to them. The high speed is the key. Certainly we are capable of moving at 160, 170 miles an hour. If we do that, then they have a scheduling problem with the old slowboat going down the track. If in fact we develop a system such as Rail America it is a new mode and the interface would be through the intermodalism brought about by the container.

Mr. **Glickman**. If we are going to go out and build 21,000 new rail miles in this country, and I assume that means transcontinenal routes and north-south routes, how do existing railroads interface with that? Do they rent space on the lines, whereas now they own their own track?

Mr. **Harp**. They would pay fees to use the right-of-way and the electrical energy that they would consume. There is a question as to whether or not you could allow diesel locomotives on it. I think you could if they maintain the speeds required. I think it important to recognize that the system is not being designed or we do not envision it as being designed as a peculiar system. In fact, any train that met the requirements could operate on it, whether it be the Ohio or the southern California train or be a train belonging to Union Pacific or Burlington Northern or Southern.

Mr. **Glickman**. It would be like an interstate highway system then?

Mr. **Harp**. Exactly. And by the way, the access to and from that system would be by the high-speed interchanges, much the same as we see on the interstate highway, where they were economically justified. Assume we come to a juncture with a main line of Southern Railroad or ConRail or whoever. Then by using a high-speed ramp to where the train could make the necessary entry speed to get onto the primary system, he would come on. By the same token he would come off on a ramp that would allow him to slow down after he got off the main track. You would not have the gas station or the passenger station on the main line. It would in fact be offset.

Mr. **Glickman**. You see both passengers and freight being able to move on this kind of system?

Mr. HARP. We see the high-value freight, containerizable, moving on this system. We do not see the classification yard or the freight yard of today's railroad in it. We see an interchange point where a container would switch onto the system and move through the system very quickly, the idea being if you look at the average weights of the materials when containerized, they are not the heavy freight that we think of in terms of rail freight. What is now going piggyback would fit this very nicely.

Mr. GLICKMAN. You called high-speed passenger corridors a Band-Aid solution to the country's transportation problems. Do you think it would be a mistake for this country to pursue the plans that Amtrak has talked about today?

Mr. HARP. I think we have to be very careful there. I do not think it is a mistake in that something has to be done. I think to enter this kind of a program without a plan, without a national plan, that what we wind up with is a Heinz 57. We will have a multiple variety of systems being developed under the auspices of regional areas and to link that together may be difficult. The American public is entitled to mobility. That goes beyond the corridors of high-density population. We have a current transportation requirement and when we look to the year 2000, that requirement is in most instances doubled. So I think to plan an incremental approach, without in essence having someone in charge to in fact make it link together, is not to the best interest of the American public.

Mr. GLICKMAN. You talked about national defense a little bit. In your written testimony you mentioned that military preparedness exercises have demonstrated the inadequacy of our transportation system in America. I wonder if you would elaborate on that point as well as your belief on whether a national high-speed network could be justified on national security grounds.

Mr. HARP. An elaboration on the military exercises, I think we want to be careful that we do not get into classified material, but I can say this, that most of the military equipment in the way of armor would move as things are now through say the gulf coast ports, Houston, places like this. If you took the military equipment out there to reinforce NATO, as an example, what we call the "wet time," the time that the equipment is aboard ship is almost double what it would be if we took that same equipment out of the Northeast ports. The problem is that now it is quicker, because by the time we make all the necessary rail connections and get the equipment up to the Northeast ports, the same time is consumed. A rapid-rail system enabling us to get the equipment to the ports in the Northeast would cut down the wet time, therefore the time the shipping was exposed to interdiction.

Admiral Kidd, who recently left the Navy and is recognized as one of our top logisticians, stated that our losses in transport time to reinforce NATO would be extremely high, 40 to 50 percent of our shipping would be lost because of exposure time. We cannot defend the sea lanes. That is NATO. If you want to expand that and look at other portions of the world by going as far as we can on the infrastructure before we put it in the ship, we can make significant reductions on sailing time. To move the forces on the west coast into Europe would require bringing them around through the canal, because the transcontinental trip to move it by rail would just be too much. So I think in answer to your question, we can reduce wet time. That is the primary thing, by using our infrastructure to move the military materials and equipment from wherever they are in this country to the closest port to where we want to go.

I did not answer the second portion of the question.

Mr. GLICKMAN. That related to—do you think it can be justified on national security grounds?

Mr. HARP. We have not ever looked at it in terms of totally justifying it on the basis of national security. We think the national security element is extremely important and would play a large role in its justification. However, the economic benefits are such that we feel that they can stand by themselves. The fact is there is a very critical element in the national security arena that has to be addressed here, and to that extent we can justify it. We have never attempted to do that. However, it is just as critical to national defense as the Interstate Highway System was and is. We simply cannot get from where we are to where we want to go in reasonable closure times today.

Mr. GLICKMAN. You alluded to this in your testimony, that our Interstate Highway System has its own right-of-way maintained through the Highway Trust Fund. A similar system exists for our airway system. Do you envision a similar arrangement for a national high-speed rail system?

Mr. HARP. I do not think it would be necessary. I think we have learned since the Highway Trust Fund was set up, through the Comsat experience, that if we have a viable economic program that it can be self-sustaining, and I think we can experience the same thing here. With even a portion of the available traffic being diverted to such a system as we are discussing it would be economically viable without Government subsidy. I think the Comsat approach—we are talking about being able to run as a primary distribution for fiber optics or cryogenic power or the command-and-control system of this country. It opens up electronic mail, it opens up a number of things that we feel are constrained today and remaining on the shelf for lack of right-of-way. If we use the intelligence we have to design the right-of-way——

Mr. GLICKMAN. You would combine both the railroad with the communications——

Mr. HARP. Yes, sir. It is a natural. We have to put electrification and communications onto the system right away now just to run the railroad. So in order to further amortize that expense, why not enlarge the vault that would run underneath or parallel to the rail track itself in the same right-of-way to carry or lease space, if you would, for communications and utility distribution.

Mr. GLICKMAN. Have you done any studies on how much electricity would be utilized in this kind of a system?

Mr. HARP. We have not. We have taken the report as put out in the National Transportation Study Commission, the electrification report put out by DOT, and used those as the basis. I do not have that number with me.

Mr. **Glickman**. Are there any users who have indicated any interest in your plan, any of the transportation companies, communications companies?

Mr. **Harp**. No, sir; we have never approached them directly to solicit whether or not they would be interested in it.

Mr. **Glickman**. You know the American Association of Railroads came here yesterday and basically talked about how advanced the state of technology was in connection with freight transportation. And the reason why I asked that is because whether that is true or not, you are talking about a tremendous institutional threat to the current method in which we move freight in this country.

Mr. **Harp**. If I read their testimony correctly, they spoke to heavy freight movement, and I would not challenge that at all. I do not disagree that they are doing a credible job in moving heavy freight. I submit if we look at the average speeds of rail and of moving freight in this country that we might look at it differently. According to the data collected by both the Transportation Policy Study and the Trends and Choices in DOT, the average speed of all freight is about 6.9 miles an hour. I am speaking door to door now. Rail is only 4 miles an hour. I do not see what we are proposing as a threat to the heavy bulk movement of freight in this country. I do see a tremendous void, if you will, in our transportation system for the high-productive or the high-value freight where our companies have actually gone out of business because when you add the cost of the manufacture to the cost of the transportation, the market went away and it was cheaper to buy it elsewhere. And that is the market we are talking about, that revitalization. Let us lay the groundwork, provide the transportation network, not only to move people, but the high-value materials so we can get our industry back on track.

Mr. **Glickman**. In your opinion, what would be the impact on this country if we do not significantly modernize our rail transportation?

Mr. **Harp**. I look at a $900 billion bill to repair highways that will give us the highways we have today. I look at the expense of going and working on $10 billion, I believe it is, for new air control systems that will give us basically the airfields and the air traffic, with significantly more capacity than we have today. I look at the projections of going from roughly 2½ trillion ton-miles of freight in 1977 to 6.3 trillion ton-miles in the year 2000, and I submit to you that there is no way that we are going to Band-Aid ourself into that kind of economic growth, particularly when you look at barges going aground in the Mississippi just this past summer because of lack of water. There has to be something to relieve the pressures on the existing modes. That is really what we are talking about, not to the detriment of those modes, but relieve the pressures so we can handle the growth that is coming. I submit that with 20 years between now and when those so-called projections will come about, even in the low-growth scenario, which economically I do not think the country is looking forward to, we either start building such a system now or the economic penalty is going to be upon us. We cannot build them overnight. If you take what we contemplate as the resources being available to devote to such an effort, if you apply them all up to the maximum extent, we are talking a 20-

to 25-year construction program. We are there, and we continue to Band-Aid. And I submit the Band-Aids are not—I guess if we put enough of them together we might have a pretty good-sized bandage, but that is what it is going to be, a bandage.

Mr. GLICKMAN. Thank you very much for your testimony.

Our next witness is William Dickhart, assistant to the technical director of the Budd Co.

Good afternoon. It is a pleasure to have you here. All my wife's family is from the northwest Detroit area, so I have gone past your facilities many times. Why do you not go ahead and proceed. You have some slides, do you not, to show?

Mr. DICKHART. We do, Mr. Chairman.

Mr. GLICKMAN. Proceed.

STATEMENT OF WILLIAM DICKHART, ASSISTANT TO THE TECHNICAL DIRECTOR, THE BUDD CO., ACCOMPANIED BY PAUL SHIRAR, VICE PRESIDENT, CORPORATE DEVELOPMENT, AND PAUL SICHERT, VICE PRESIDENT, PUBLIC AFFAIRS

Mr. DICKHART. Mr. Chairman and members of the committee, I am William Dickhart, representing the Budd Co. With me are Paul Shirar, vice-president, corporate development, and Paul Sichert, vice-president, public affairs of the Budd Co.

We consider it a distinct privilege to have been asked to testify before the Subcommittee on Transportation, Aviation, and Materials, and to discuss what we firmly believe will be a dynamic future for the American transportation industry, and the newest breakthrough in advanced rail technology.

By way of background, the Budd Co. is America's only existing maker, designer, and builder of passenger rail cars. We have been in this business for over half a century. We consider ourselves a company with an all-important tradition and vital understanding of the Nation's rail transportation industry.

Budd is extremely proud of its past accomplishments. In 1934 we built the Pioneer Zephyr, the world's first streamlined, all-stainless steel, diesel-powered train, which established a cross-country speed record. In 1964, Budd designed and built the 160-mph Metroliner running from Washington to New York, proving that fast and efficient train travel could attract commuters back to rail transportation. Budd also built the undercarriage for the LIM-RV vehicle which set the land speed record of 257 mph in 1972. That is the world's rail speed record held by the United States conducted at Pueblo, Colo. in 1972. Over the past 50 years we have built more than 11,000 cars for the world's most progressive railroads and mass transit systems. We believe our tradition in this industry helps us understand what will be required to reorganize American rail transportation. We also believe we have a concept which can reshape American rail transportation into the most advanced system of its kind in the world. We believe we have both the historical expertise and the advanced technology needed to help usher in a bold and creative era in transportation in the United States.

As America approaches the 21st century, it faces staggering economic challenges. Each member of the committee is acutely aware of this fact. Among the most critical challenges facing us are the reindustrialization of key segments of American industry, the need to create millions of new jobs in healthy, productive businesses, and to embrace state-of-the-art technology in a concerted effort to insure that American industry remains at the cutting edge of worldwide scientific and technological advancement. What is more, these economic and scientific challenges must be met with an ever-wary eye on the continuing national need to reduce U.S. dependency on foreign sources of energy, and to enhance the environment in which we all live.

The American transportation system faces all these challenges, and many more. To some, the problems may seem insurmountable. To us, these enormous problems offer equally impressive opportunities; they foster an environment willing to encourge scientific breakthroughs in areas vital to the long-term economic security of the Nation.

We at Budd are convinced that we stand at the threshold of a new technological era in the rail transportation industry. We believe we have a proven technological concept which can, in a significant way, help simultaneously meet the challenges of reindustrialization, jobs creation, and state-of-the-art technological innovation. At the same time, substantially lessen our existing dependency on foreign oil and make a major contribution toward enhancing the environment.

Mr. Chairman, this dramatic technological advancement is, put simply, a train that flies.

Before I explain some of the details of what this ultra-high-speed transport system called the "Skytrain" is, let me tell the members of the committee what it is not.

The Skytrain is not a pale imitation of the conventional "bullet" trains of France, Japan, and England.

It is not an unproven technological pipedream requiring decades before it is in service. It is not a warmed-over, or slightly upgraded version, of existing, conventional rail transportation in this country.

Skytrain constitutes a quantum technological leap beyond any existing conventional rail system. It incorporates technology which magnetically levitates passenger cars above an elevated guideway.

This technology, known as maglev, allows the Skytrain to literally fly above ground level. This system is being offered by Budd, which has the exclusive rights in the Western Hemisphere from its sister company, Thyssen Henschel of Kassel, West Germany. Thyssen and its associates have been developing this system for over a decade in Germany and in 1979 operated the first Maglev system in the world approved for passenger transport. Final full-scale testing of a 200-passenger vehicle on a 20-mile guideway will begin this summer in Emsland, Germany and the first completed Skytrain could be built and put into service by the mid-1980's.

Let me stress to the committee that Budd is an American company paying American taxes and providing thousands of Americans jobs. We believe the Skytrain concept offers the potential for tens of thousands of additional jobs in this country in an exciting new industry.

The Skytrain is an ultra-high-speed transport system in which vehicles are magnetically levitated, then propelled along an elevated guideway at speeds of 250 miles an hour.

These speeds are well beyond the 160 miles per hour achieved by more conventional trains in France, Japan, and elsewhere overseas. These high speeds, combined with the convenience of downtown-to-downtown service, give the Maglev technology a major potential market in principal intracity corridors of the United States and elsewhere in North and South America. We believe the Skytrain will offer a competitive, time-efficient alternative to plane flights between high-density population centers, thus easing crowding and confusion in the Nation's airports.

At this time I would like to draw particular attention to the November 3, 1981 study of the future of passenger rail transportation done by the Joint Economic Committee under the leadership of Chairman Henry S. Reuss and Vice Chairman Roger W. Jepsen. This excellent analysis, together with a bill introduced by Chairman Reuss (H.R. 4028), enumerates 20 urban corridors in the United States which are likely possibilities for high-speed rail passenger service.

I would like to include those items at the conclusion of my testimony. At the same time I would also like to include answers to some of the questions that were posed in the committee's original letter inviting us to testify.

Getting back to Skytrain, we believe Skytrain service will serve to encourage millions of people to leave their cars behind on medium-distance trips, thus easing wear and tear on the Nation's highway system and energy usage nationwide.

We have also studied Skytrain service between downtown Washington and Dulles Airport. If you have no objection, I would also like to include a copy of that study at the conclusion of my testimony.

Mr. GLICKMAN. It will be included.

Mr. DICKHART. Thank you, sir.

Using maglev technology, the Skytrain operates free from conventional steel on steel rail limitations. There is no contact between the rail and the train in operation.

The passenger vehicle is equipped with electromagnet side packs which guide it along a magnetic track. It is powered by the traveling magnetic field created with the electromagnets on the vehicle which interact with the linear motors on the track. The Skytrain vehicle is pulled up from the rails by levitation magnets thus allowing it to hover above the guideway.

At the same time the suspension of the Skytrain actually surrounds the guideway thus eliminating the possibility of derailments. This unique capability adds immeasurably to the safety of the Skytrain compared with other forms of transportation, and allows it to operate in virtually any weather conditions. It also insures an amazingly quiet and comfortable ride.

As I have indicated, the Skytrain offers significant energy savings compared with highway or air transportation. The energy required for each seat per kilometer would be less than that required for a 60-watt lightbulb per hour. It is also important to note that the Skytrain is not dependent on oil for its operation, thus helping to ease U.S. dependency on foreign energy sources.

Another important feature which we believe separates the Skytrain equipped with maglev technology from conventional bullet trains is the speed of construction. To achieve in the United States the 160-miles per hour speeds reached overseas, the bullet trains in Japan and France will require completely new tracks and facilities in this country.

I do not have to detail for the committee the costs and time constraints which would soon arise in an effort to upgrade and incorporate conventional, high-speed rail service into the existing rail infrastructure.

Again, the Skytrain offers an important and valuable difference. Skytrain is designed to be built adjacent to or over existing highways and to operate 15 to 20 feet from ground level. This unique design limits land acquisition costs, environmental disruption, and potential problems and time delays related to acquiring legal rights-of-way.

Mr. Chairman, it is in our opinion an unfortunate irony that an American corporation with a viable and exciting transportation alternative for the future has, up until now, been overshadowed by conventional high-speed developments in France, Japan, and England. This is particularly ironic because we firmly believe that the technology we offer is dramatically different and superior to high-speed trains elsewhere in the world. It is also troublesome because we have been forced to compete with foreign industries which have received long-term Government subsidies of their research and development efforts. In the manufacturing of rail commuter cars, these foreign government subsidies have helped insure that most cars destined for the U.S. marketplace are being procured abroad. This costs thousands of U.S. jobs and adds to our burgeoning balance-of-trade deficit. With the Skytrain concept, we at Budd are determined to stop this flow of American jobs and money abroad by offering the most advanced technology of its kind here at home.

We believe that the Skytrain and maglev technology can help in a significant way to meet the enormous challenges enumerated at the outset of my testimony.

To help meet the challenge of reindustrialization, a nationwide system of Skytrains operating between high-density population centers would insure a tremendous infusion of wealth into the American rail, steel, concrete, electronics, power, and other industries. Ultimately, we believe that consumer demand for travel by Skytrain will be sufficient to make a profit for private investors. State or Federal government assistance, in the form of long-term loan guarantees, grants, and funds for initial feasibility studies may be required at the outset. We are aware of the serious budget constraints on Congress. We strongly believe, however, that such funds and guarantees will reap tremendous long-term economic benefits and Government revenues for comparatively small investments. In this regard, it is helpful to recall that between 1957 and 1976 the United States spent $75 billion on highways. By contrast, during the same period only some $1 billion was spent on the Nation's railroads. We believe that consumer demand for Skytrain travel will lead to the reindustrialization, and strong economic growth, of the rail transportation industry, and others that serve it.

Similarly, a network of intercity Skytrains would create tens of thousands of new jobs in the rail, and many related, industries. The economic ripple effect of a new, dynamic, and expanding industry would be vital to the depressed employment conditions in these important sectors of the economy, helping turn them into growth industries again.

Skytrain, as I mentioned before, also addresses the ongoing national need for energy conservation. We have seen remarkable reductions in energy costs in recent months due in large measure to the national conservation effort encouraged by Congress. It is vital that conservation efforts continue to be expanded to insure a further reduction in the price of foreign energy. Skytrain can help this effort.

Skytrain's unique ability to be built along or above existing highway systems also insures that economic growth of the system will not cause serious environmental disruption. In addition, by encouraging people to choose this high-speed system of transportation between cities, it will also help reduce atmospheric pollution.

Finally, the Skytrain concept will also help vault America ahead of the rest of the world in advanced rail technology. Experience with space exploration has clearly demonstrated that faith in our scientific genius can lead to vital discoveries and economic growth. Most importantly, it can alter our vision of the future and enhance our pride as a Nation. The Skytrain can help change our vision of the future of rail transportation in this country as we approach the 21st century.

Mr. Chairman, we at Budd firmly believe that, as an American company, we have a technological concept second to none. We are anxious to see the Skytrain system and maglev technology directed toward helping solve the enormous challenges we face as a Nation. We believe we stand at the threshold of a revolution in rail transportation both in this country and around the world.

We are also pleased to acknowledge that the city of Las Vegas has offered us a contract to study high-speed and superspeed systems in the Los Angeles-Las Vegas corridor. This program I believe was outlined yesterday by the mayor of Las Vegas. We are very pleased to be involved in that effort.

We are grateful for this opportunity to testify before the committee today and to share with you our vision of the future. Thank you.

[The prepared statement of Mr. Dickhart and additional information follow:]

Testimony of William Dickhart
before the House Science and Technology Committee,
Subcommittee on Transportation, Aviation, and Materials

Mr. Chairman and distinguished Members of the Committee, I am William Dickhart representing the Budd Company. With me are Paul Shirar, Vice President, Corporate Development; and Paul Sichert, Vice President, Public Affairs. We consider it a distinct privilege to have been asked to testify before the Subcommittee on Transportation, Aviation, and Materials, and to discuss what we firmly believe will be a dynamic future for the American transportation industry, and the newest breakthrough in advanced rail technology.

The Budd Company is America's only existing maker, designer and builder of passenger rail cars. We have been in this business for over half a century. We consider ourselves a company with an important tradition and a vital understanding of the nation's rail transportation industry.

Budd is extremely proud of its past accomplishments. In 1934 we built the Pioneer Zephyr, the world's first streamlined, all-stainless steel, diesel powered train, which established a cross-country speed record. In 1964, Budd designed and built the 160 mph Metroliner running from Washington to New York, proving that fast and efficient train travel could attract commuters back to rail transportation. Budd also built the undercarriage for the LIM-RV vehicle which set the land speed record of 257 mph in 1972. Over the past 50 years we've built more than 11,000 cars for the world's most progressive railroads and mass transit systems. We believe our tradition in this industry helps us understand what will be required to reorganize American rail transportation. We also believe we have a concept which can reshape American rail transportation into the most advanced system of its kind in the world. We believe we have both the historical expertise and the advanced technology needed to help usher in a bold and creative era in transportation in the United States.

The Challenges of the Future

As America approaches the 21st century, it faces staggering economic challenges. Each member of the Committee is acutely aware of this fact. Among the most critical challenges facing us are the reindustrialization of key segments of American industry, the need to create millions of new jobs in healthy, productive businesses, and to embrace state-of-the art technology in a concerted effort to insure that American industry remains at the cutting edge of worldwide scientific and technological advancement. What's more, these economic and scientific challenges must be met with an ever-wary eye on the continuing national need to reduce U.S. dependency on foreign sources of energy, and to enhance the environment in which we all live.

The American transportation system faces all these challenges, and many more. To some, the problems may seem insurmountable. To us, these enormous problems offer equally impressive opportunities; they foster an environment willing to encourage scientific breakthroughs in areas vital to the long-term economic security of the nation.

We at Budd are convinced that we stand at the threshold of a new technological era in the rail transportation industry. We believe we have a proven technological concept which can, in a significant way, help simultaneously meet the challenges of reindustrialization, jobs creation, and state-of-the art technological innovation. At the same time, this breakthrough can substantially lessen our existing dependency on foreign oil and make a major contribution toward enhancing the environment.

Mr. Chairman, this dramatic technological advancement is, put simply, a train that flies.

Before I explain some of the details of what this ultra-high speed transport system called the "Skytrain" is, let me tell the Members of the Committee what it is not. The Skytrain is not a pale imitation of the conventional "bullet" trains of France, Japan and England. It is not an unproven technological pipedream requiring decades before it is in service. It is not a warmed-over, or slightly upgraded version, of existing, conventional rail transportation in this country.

The Magnetic Levitation Skytrain

Skytrain constitutes a quantum technological leap beyond any existing conventional rail system. It incorporates technology which magnetically levitates passenger cars above an elevated guideway. This technology, known as "Maglev", allows the Skytrain to literally "fly" above ground level. This system is being offered by Budd, which has the exclusive rights in the Western Hemisphere from its sister company, Thyssen Henschel of Kassel, West Germany. Thyssen and its associates have been developing this system for over a decade in Germany and in 1979 operated the first Maglev system in the world approved for passenger transport. Final full-scale testing of a 200-passenger vehicle on a 20-mile guideway will begin this summer in Emsland, Germany, and the first completed Skytrain could be built and put into service by 1984.

Let me stress to the Committee that Budd is an American company, paying American taxes and providing thousands of Americans jobs. We believe the Skytrain concept offers the potential for tens of thousands of additional jobs in this country in an exciting new industry.

The Skytrain is an ultra-high speed transport system in which vehicles are magnetically levitated, then propelled along an elevated guideway at speeds of 250 miles per hour. These speeds are well beyond the 160 miles per hour achieved by more conventional trains in France, Japan and elsewhere overseas. These high speeds, combined with the convenience of downtown-to-downtown service, give the Maglev technology a major potential market in principal intra-city corridors of the United States and elsewhere in North and South America. We believe the Skytrain will offer a competitive, time-efficient alternative to plane flights between high-density population centers, thus easing crowding and confusion in the nation's airports.

At this time I would like to draw particular attention to the November 3, 1981 study of the future of passenger rail transportation done by the Joint Economic Committee under the leadership of Chairman Henry S. Reuss and Vice Chairman Roger W. Jepsen. This excellent analysis, together with a bill introduced by Chairman Reuss (H.R. 4028), enumerates 20 urban corridors in the U.S. which are likely possibilities for high-speed rail passenger service. I would like to include both of these items at the conclusion of my testimony, together with our answers to the general questions posed in the Committee's original letter inviting us to attend this hearing. We believe Skytrain service will serve to encourage millions of people to leave their cars behind on medium distance trips, thus easing accident rates, wear and tear on the nation's highway system, and energy usage nationwide.

We have also studied Skytrain service between downtown Washington and Dulles Airport. If there is no objection, I would also like to include details of this plan, which could help substantially ease congestion at National Airport, at the conclusion of my remarks.

Using Maglev technology, the Skytrain operates free from conventional "steel on steel rail" limitations. The passenger vehicle is equipped with electromagnetic side packs which guide it along a magnetic track. It is powered by the traveling magnetic field created when the electro-magnets on the vehicle interact with the linear motors on the track. The Skytrain vehicle is pulled up from the rails by levitation magnets thus allowing it to hover above the guideway. At the same time the suspension of the Skytrain actually surrounds the guideway thus eliminating the possibility of derailments. This unique capability adds immeasurably to the safety of the Skytrain compared with other forms of transportation, and allows it to operate in virtually any weather conditions. It also insures an amazingly quiet ride.

As I've indicated, the Skytrain offers significant energy savings compared with highway, conventional rail, or air transportation. We have projected that in a system 27 kilometers long, the energy used would be less than a 60-watt lightbulb per seat. It is also important to note that the Skytrain is not dependent on oil for its operation, thus helping to ease U.S. dependency on foreign energy sources.

Another important feature which we believe separates the Skytrain equipped with Maglev technology from conventional "bullet" trains is the speed of construction. To achieve in the U.S. the 160 mph speeds reached overseas, the "bullet" trains in Japan and France will require completely new tracks and facilities in this country. I don't have to detail for the Committee the costs and time constraints which would soon arise in an effort to upgrade and incorporate conventional, high-speed rail service into the existing rail infrastructure.

Again, the Skytrain offers an important and valuable difference. Skytrain is designed to be built adjacent to or over existing highways and to operate 15-20 feet from ground level. This unique design limits land acquisition costs, environmental disruption and potential problems and time delays related to acquiring legal rights of way.

Mr. Chairman, it is in our opinion an unfortunate irony that an American corporation with a viable and exciting transportation alternative for the future has, up until now, been overshadowed by conventional high-speed developments in France, Japan and England. This is particularly ironic because we firmly believe that the technology we offer is dramatically different and superior to high-speed trains elsewhere in the world. It is also troublesome because we have been forced to compete with foreign industries which have received long-term government subsidies of the research and development efforts. In the manufacturing of rail commuter cars, these foreign government subsidies have helped insure that most cars destined for the U.S. marketplace are being procured abroad. This costs thousands of U.S. jobs and adds to our burgeoning balance of trade deficit. With the Skytrain concept, we at Budd are determined to stop this flow of American jobs and money abroad by offering the most advanced technology of its kind here at home.

We believe that the Skytrain and Maglev technology can help in a significant way to meet the enormous national challenges enumerated at the outset of my testimony.

Reindustrialization

To help meet the challenge of reindustrialization, a nationwide system of Skytrains operating between high-density population centers would insure a tremendous infusion of wealth into the American rail, steel, concrete, electronics, and other industries. Ultimately, we believe that consumer demand for travel by Skytrain will be sufficient to make a profit for private investors. State or federal government assistance, in the form of long-term loan guarantees, grants, and funds for initial feasibility studies, may be required at the outset. We are aware of the serious budget constraints on Congress. We strongly believe, however, that such funds and guarantees will reap tremendous long-term economic benefits and government revenues for a comparatively small investment. In this regard, it is helpful to recall that between 1957 and 1976 the U.S. spent $75 billion on highways. By contrast, during the same period only some $1 billion was spent on the nation's railroads. We believe that consumer demand for Skytrain travel will lead to the reindustrialization, and strong economic growth, of the rail transportation industry, and others that serve it.

Jobs

Similarly, a network of inter-city Skytrains would create tens of thousands of new jobs in the rail, and many related, industries. The economic "ripple effect" of a new, dynamic, and expanding industry would be vital to the depressed employment conditions in these important sectors of the economy, helping turn them into growth industries again.

Energy and the Environment

Skytrain also addresses the ongoing national need for energy conservation. We have seen remarkable reductions in energy costs in recent months due in large measure to the national conservation effort encouraged by Congress. It is vital that conservation efforts continue to be expanded to insure a further reduction in the price of foreign energy. Skytrain can help this effort.

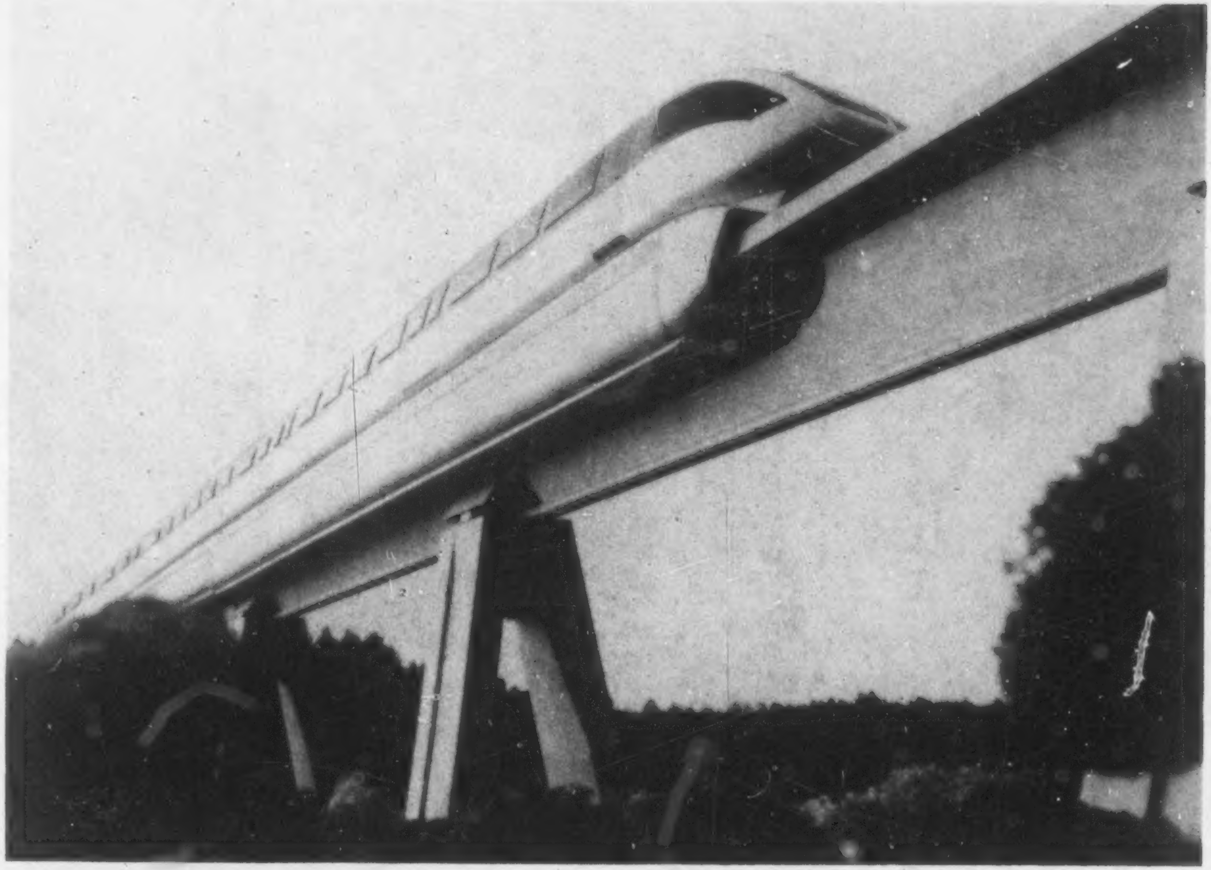
Skytrain's unique ability to be built along or above existing highway systems also insures that economic growth of the system will not cause serious environment disruption. In addition, by encouraging people to choose this high speed system of transportation between cities, it will also help reduce atmospheric pollution from cars and planes.

Advanced Technology

Finally, the Skytrain concept will also help vault America ahead of the rest of the world in advanced rail technology. Our experience with space exploration has clearly demonstrated that faith in our scientific genius can lead to vital discoveries and economic growth. Most importantly, it can alter our vision of the future and enhance our pride as a nation. The Skytrain can help change our vision of the future of rail transportation in this country as we approach the 21st century.

Mr. Chairman, we at Budd firmly believe that, as an American company, we have a technological concept second to none. We are anxious to see the Skytrain system and Maglev technology directed toward helping solve the enormous challenges we face as a nation. We believe we stand at the threshold of a revolution in rail transportation both in this country, and around the world.

We are therefore extremely grateful for this opportunity to testify before the Committee today and to share with you our vision of the future. Thank you.



Passengers in the ultra high speed magnetic levitation system, introduced in the Western Hemisphere by The Budd Company, are transported at speeds of 250 miles per hour. For more information, call Budd Public Affairs at 313-643-3520.

CASE STUDIES IN PRIVATE/PUBLIC COOPERATION TO REVITALIZE AMERICA:

I. PASSENGER RAIL

REPORT

Of The

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

November 3, 1981

INTRODUCTION

By Chairman Henry S. Reuss

and

Vice Chairman Roger W. Jepsen

This Report carries forward the Joint Economic Committee's tradition of bipartisan collaboration on major economic issues, as expressed most recently in our unanimous 1981 Midyear Report on Productivity. In that Report, issued at the height of last summer's economic policy debate, the Committee rose above partisan considerations to address an issue of compelling national importance: Productivity. Here, we continue to work together in addressing a crucial component of that larger issue; namely, our national need for a balanced, efficient system of passenger transportation which includes adequate high-speed, inter-urban passenger rail.

This Report is the first in a series of Reports which the Joint Economic Committee will be preparing in the months ahead on the subject of "Private/Public Cooperation to Revitalize America." These Reports will each focus on a single industry or sector whose future development and prosperity is, in our judgment, vital to the development and prosperity of the national economy as a whole. As we examine these sectors, we will point out the potential in each case for cooperation between the private sector and the public sector, and suggest mechanisms which can facilitate that cooperation. Our choice of industries and sectors in these case studies will be guided by a simple criterion: we will choose those areas where the greatest benefits are to be attained. In particular, we will examine industries and sectors that make two kinds of contributions to our national wealth: a direct contribution to the production of goods and services for American consumers and for export, and a catalytic contribution to the development of other industries. With this criterion, we go beyond the sterile dichotomy between "picking winners" and "picking losers" that one hears from time to time. In our judgment, these tasks are and should remain the essential domain of the market. But there are areas where sensible private and public cooperation, by "picking catalysts," can dramatically improve our national economic well-being and the prospects for future growth.

Passenger rail transport is such a case. As the following pages will argue, a new system of high-speed passenger rail transit, comparable to the Japanese Shinkansen, the British High Speed Train service, and the French Tres Grande Vitesse, can make a significant contribution toward the creation of a balanced national transportation system, a return of investment and growth to American cities and towns, the conservation of energy and reduction of our dependence on foreign oil, and toward the ultimate goal of restored productivity growth, improved international competitiveness, and a better life for all.

CASE STUDIES IN PRIVATE/PUBLIC COOPERATION TO REVITALIZE AMERICA: I. PASSENGER RAIL

A nation's transportation network is an integral component of its economic and social structure. The transportation system serves to speed the movement of people, goods, and ideas across a nation and between countries. Even more important, efficient transportation is an indispensable element in the productivity and competitiveness of industry. Good transport means everything from access to raw materials, ability of labor to reach jobs, and the efficient operation of product markets. The development and maintenance of a balanced, modern, and efficient transportation system is necessary if a society is to grow and prosper.

The critical relationship between transportation systems and national development has been evident throughout America's history. During the colonial period, America's economy was based upon water transportation and on the horse. Domestic markets were largely limited by the length of navigable waters and by the long overland travel times. Canals promised some development of inland agricultural resources, but canals were expensive and slow. In the 19th century all of this changed. The development of the railroads was a driving force in America's westward expansion and in our industrial revolution. As the railroads grew in size and speed, the economy reached new levels of prosperity, both because of expanded market areas and because of the great impetus to coal, steel and machinery production created by the demand for rails and rolling stock.

The 20th century brought with it an even greater increase in the speed and ease of transportation. The major transportation developments of this century were the automobile and the airplane. The construction of the Interstate Highway System provided an inexpensive and convenient transportation network to the general public, as well as to the trucking industry. The development of the commercial airline industry provided a transportation system which, in effect, further reduced the great size of America by dramatically decreasing travel times. Throughout the United States' history, the development of new transportation modes and systems has been a catalyst to economic growth and social progress.

Today, however, serious questions are being raised about the condition and future viability of America's transportation network. Representative Bud Shuster (R-Pa.), Chairman of the Congressionally-mandated National Transportation Policy Study Commission, upon release of that commission's final report in June, 1979, stated that a "transportation crisis in this country is just around the corner." The transportation system will be called upon to handle increasing amounts of freight and passenger traffic over the next two decades. In its report, the National Transportation Policy Study Commission estimated that by the year 2000, national domestic person-miles of travel will increase 81 to 96 percent and national domestic freight ton miles will increase between 165 and 314 percent. The existing transportation system will be hard pressed to handle this dramatic increase over such a short period of time.

The U.S. Highway System is rapidly deteriorating. According to the Federal Highway Administration, the Federal government must expend $360 billion (in 1980 dollars) over the next 15 years just to maintain and repair existing far-from-adequate road quality of the 847,000 mile Federally aided highway system. In addition, certain stretches of the system are dangerously overcrowded with no room for expansion. The problems of the Federally aided highway system are no different than the ones which State and local officials confront when they examine other segments of the American highway network.

Other major forms of domestic transportation are also experiencing difficulties. The Nation's major airports and primary air lanes are congested and overcrowded. Even though major population centers receive adequate air service, many smaller communities are losing service as a result of airline deregulation and the increasing cost of providing service. In the Northeast and Midwest, some of the freight railroads are experiencing severe financial difficulties. Major freight railroads across the Nation are troubled by deteriorating track and equipment.

Compounding the possibility that the present transportation system may be unable to meet future demands is the dramatic rise in the price of petroleum-based fuels, and uncertainty over their future availability. The increase in the cost of fuel has been translated into equally dramatic increases in the cost of transportation services and personal travel. A further negative consequence of the energy issue is the United States' dependence on foreign energy sources.

One part of the answer in meeting the Nation's future transportation needs would be the establishment of a balanced transportation system: a system which capitalizes on the benefits of every mode of transportation, rather than extending the use of one or two modes into areas where they are not the most efficient or economical. An important component of a balanced transportation system, and one part of the solution in meeting future transportation demands, is a viable rail system, including passenger operations.

Many of the world's major industrial nations, in recognition of the need for passenger rail, have continued to build modern passenger rail systems since the end of World War II. The United States, though, has allowed its passenger rail system to deteriorate. Policies promoting rail passenger systems are already in place in Canada, Japan, and throughout Western Europe. These nations have recognized the benefits of a modern passenger rail system. The United States is one of the few industrialized countries in the world where there is still serious debate over the future of rail passenger service.

Perhaps the best known example of a modern, high-speed passenger railroad is the Shinkansen or "Bullet Train" of the Japanese National Railway. Construction of the first section of the Shinkansen between Tokyo and Shin Osaka was authorized in 1957. Based on the implementation of new and advanced technologies, the Bullet Trains make the 320 mile trip between Tokyo and Shin Osaka in 3 hours and 10 minutes. On a regular basis, the train reaches a top speed of 130 miles per hour and operates at an average speed of approximately 100 miles per hour. The newest section of the Shinkansen stretches 350 miles between Shin Osaka and Hakata. Traveling at an average speed of over 90 miles per hour, with a top speed of 130 miles per hour, the trip takes 3 hours and 44 minutes.

The Bullet Trains have become a major form of passenger transportation in Japan. Over 120 million people a year have used the high-speed rail system since 1976. On a busy day, as many as 275 trains operate on the Shinkansen. On the Shin Osaka-Hakata line, two trains depart every hour. Service on the Tokyo-Shin Osaka line is even more frequent. At certain peak-travel times, up to nine trains an hour will depart. These trains operate like clock work over the entire system, sometimes with only a few minutes between trains.

The Japanese experience with high speed passenger rail will not end with the existing Shinkansen system. The Japanese are constantly designing and testing new technologies. In addition, three new high-speed lines are being constructed and 12 others are being studied.

The development of high-speed passenger rail systems is not limited to Japan. In 1976, the British introduced the 125 mile per hour High Speed Train (HST) into regular passenger service. The HST, along with some other rail improvements, helped reverse a decline in passenger ridership which had occurred in 1975. The British are currently testing a new high-speed train called the British APT (Advanced Passenger Train), which employs cars that tilt as they go around corners in order to allow higher operating speeds.

The French made a decision in 1971 to build a direct high-speed line between Paris and Lyons. The result is what some railroad experts regard as the most advanced train in the world. On September 27, 1981, the "Tres Grande Vitesse" (TGV) began operations on the 265 mile route between the two cities reaching a top speed of 160 miles per hour. The combination of the new track and the high-speed train will reduce travel time between Paris and Lyons from 3 hours and 48 minutes to two hours flat. By 1985 the French plan to have 87 TGV units in operation. They also expect the seven hour trip between Marseilles and Paris to be reduced to four hours.

Throughout Europe and Canada, high-speed trains are either already in operation or currently being developed. Sweden and West Germany currently operate high-speed passenger rail systems. Switzerland is developing a high-speed line between Geneva and Zurich. The Italians are planning to link Milan, Florence, Rome and Naples through high-speed rail service. Canada is moving ahead with plans for high-speed service in the Windsor-Toronto-Montreal-Ottawa and Quebec corridor.

The passenger rail system in the United States compares poorly with its counterparts in Europe and Japan. For example, Amtrak currently operates about 1,700 passenger cars. From 1975 through the end of 1980, by comparison, France placed 2,830 new cars into service. The majority of the European nations operate at least five times as many passenger cars as the United States. The largest disparity, though, is between Japan and the United States. The Japanese operate 26,000 cars over a rail system that covers only half the mileage of the U.S. system.

While the passenger railroads in the other industrialized nations are continually striving to increase the average speed of their trains, the United States has allowed its train speeds to decrease. The average speed of passenger trains in the United States has declined from 75 miles per hour in the mid-1950's to a current average of 40 miles per hour. It is interesting to note that the current U.S. average for passenger trains is slower than the 60 miles per hour average of freight trains operating in

France. The only American trains which operate at average speeds approaching those attained on the high-speed rail system of Europe and Japan are those which run in the Northeast corridor between Washington, D.C., and New York City.

There are two primary factors for the decline of the U.S. passenger rail system, traceable to the years immediately following the end of World War II. One reason is the growth in the number and use of private automobiles. The development of an excellent highway and street system, the availability of inexpensive fuel, and the increasing affluence of the American public enabling more people to purchase automobiles, all contributed to the increase in the use of automobiles. As a result, the demand for passenger rail services declined. The combination of higher fuel costs, smaller and more expensive cars, and more congested highways, is causing Americans to re-evaluate their attitudes towards personal transportation.

The second key factor, which is often overlooked, is the change in freight railroad operations since the end of World War II. The post-war economy brought many changes in the U.S. freight railroad industry. Initially, the railroads were overworked and undermaintained. In the 1950's, however, the freight railroads saw their once dominant position weaken as they began to lose business to competing truck and air freight service. In response to their declining share of the market and the poor condition of their tracks, the freight railroads changed their operations by switching to longer, heavier, and slower freight trains. This change had a dramatic effect on the passenger rail system because it forced passenger service to become slower and less dependable.

The change in freight operations had two effects on the track structure which have had negative repercussions for passenger rail service. One effect has been the reduction or elimination of the superelevation in the track. Superelevation, or tilting of the track, is necessary in order for rail cars to negotiate curves safely at high speeds. The greater use of heavier freight cars and longer trains increased the cost of maintaining track superelevation. The use of slower trains reduced the degree, or level, of superelevation required to operate freight trains. Both of these factors combined to reduce the railroads' need to maintain the high levels of superelevation required to run high-speed passenger service. The lower superelevation forced the railroads to reduce the speed of their passenger operations and increase the trip time, further reducing the attractiveness of passenger rail.

The decision by the railroad industry to run slow, heavy, and long freight trains has also resulted in greater stress and damage to the track and road bed. The movement of every heavy freight car does immediate damage to the rails. This damage is called plasticity or metallurgical failure. The destructive effect on the rails of each freight car movement is cumulative and permanent. Over time, plasticity causes the metal on the rails and the freight car wheels to flake off. As the condition of the track worsens, the railroads must slow down the operating speeds of all trains. Passenger service is further affected by the poor track condition because it causes a rough, uncomfortable ride.

The change in freight operations has other negative implications for the U.S. passenger rail system. The advent of slower freight trains necessitated that railroads adjust their track and grade crossing signalling systems to compensate for the slower speeds. Because it is prohibitively expensive to install signal equipment which can accommodate both high and low speed operations on the same track, the railroads elected to reduce the speeds of their passenger trains. Passenger train operations are also hampered by freight train interference. When two trains meet on the same stretch of track, one of the trains must pull onto a siding to allow the other train to pass. Many of the railroad sidings are too short to hold all of the cars in a long freight train. A passenger train, caught behind a slow moving freight train, will be unable to pass because the freight train cannot pull into a siding. In addition, railroad management has been accused of relegating passenger operations to a subordinate position in relation to freight operations, because freight operations are their primary sources of revenue. These factors combined have made it nearly impossible to provide dependable, fast passenger service under the current system.

Despite the limitations and problems associated with the United States' current rail passenger system, Amtrak enjoys a high level of demand on many routes. During the first half of 1981, ridership increased by up to 1,000 percent on some routes. According to Amtrak, some 645 trains were completely sold out for the summer by April 1, 1981. In addition, during August of 1980, Amtrak turned away 400,000 requests for tickets on three of its Western routes.

Amtrak's ridership has increased most significantly on the two routes which are in some ways comparable to Japan and Europe's passenger rail corridors. In the Northeast Corridor, ridership grew from 6,904,000 passengers in 1975 to a high of 8,506,000 in 1979. On the West coast, an increase in the frequency and speed of trains between Los Angeles and San Diego resulted in a four-fold increase in ridership during the six-year period from 1974 to 1980. Amtrak estimates that 1981 ridership on this route will exceed the 1980 record level of 1,254,000 passengers.

Although the reasons for the increase in ridership and demand cannot be stated with absolute certainty, a few factors appear to be most significant. Part of the increase can be attributed to travelers searching for alternatives to the increased cost of automobile and airline travel resulting from higher fuel costs. Another factor is that in the automobile industry's search for better gas mileage, new cars tend to be smaller. As a result, long trips by automobiles have become increasingly uncomfortable. Amtrak President Alan Boyd noted, in his July 23, 1981 testimony before the Joint Economic Committee, that "The trends are clear: personal travel in this country is going to become far more difficult and more inconvenient by any mode except rail."

In Amtrak's most heavily traveled corridor, the Northeast corridor, revenues are now exceeding operating costs. This fact, coupled with the recent increase in Amtrak ridership and the forecast of huge increases in future passenger rail travel demand, demonstrates the potential viability of high-speed passenger rail systems in the United States modeled after the European and Japanese systems.

The deteriorating condition of America's transportation network, the increasing cost of energy, and dependence on foreign energy sources will continue to strain the U.S. transportation system and economy during the coming years. These forces will work to increase the costs, limit the availability, and reduce the efficiency of transportation services. A proper response to these transportation-related problems can serve not only to improve the U.S. transportation system, but also to help revitalize the Nation's economy.

The need to improve the Nation's transportation system was detailed in the Joint Economic Committee's bipartisan and unanimous "1981 Mid-Year Review of the Economy." In the report, the Committee recommended that investment in vital public and private infrastructure be improved as one phase of a program to increase productivity and revitalize the economy. The Nation must have an adequate and well maintained infrastructure because proper macroeconomic policies or a well designed capital depreciation program will not have a maximum effect without proper railroads, highways, ports, water systems, utilities and the like. A highly developed infrastructure is necessary because it serves as a major component in a country's economic foundation.

One part of America's infrastructure should be a high-speed rail passenger system. The Europeans and the Japanese have demonstrated that high-speed rail passenger operations can be successful. This success can be duplicated in the United States. As personal travel becomes more difficult and inconvenient, passenger rail systems emerge as a viable and intelligent alternative to present personal transportation systems.

The development of a high-speed passenger rail system in the United States would have benefits that extend far beyond saving energy and improving personal transportation. Revitalizing the Nation's passenger railroads would provide an excellent start in reindustrializing America because it would require the creation of a major industry. For the next generation, Americans could be busy making rail locomotives and rolling stock, new track, electrification systems, and other things needed to redevelop our entire rail system. Just as the automobile helped make the 1920's prosperous, the decade of the 1980's could see an American revival based on the railroad.

Given the benefits which would accrue from the development of a passenger rail system, the United States should establish a goal of creating a high-speed rail passenger system equal to or better than those of the other industrialized nations. The development of a passenger rail system in the United States should not be a revivalist or preservationist movement. The American system should be a railroad of the future based on modern technology and new ideas.

The following recommendations outline some of the major concepts and components in the development of a successful high-speed passenger rail system in the United States:

Recommendation No. 1: Develop High-Speed Inter-City Rail Systems in Highly Populated Corridors

America's passenger railroad system should be based on current and future demand, and realistic assessments of the public's transportation needs and preferences. Experience in the United States and abroad has clearly demonstrated that passenger railroad systems can be successful if certain conditions are met. In general terms, the passenger system must provide high-speed, reliable, comfortable service that connects the major cities in highly populated corridors.

The most important factor in determining the success of a system is operating speed. Studies have shown that the rate of speed, or schedule time, is the key determinant of demand. According to Robert J. Casey, Executive Director of the Ohio Rail Transportation Authority (ORTA), in his July 23, 1981 testimony before the JEC, computer modeling performed by ORTA showed that higher speeds increased potential ridership. In France, the French National Railway has increased its share of the total passenger market relative to other modes during the past decade. According to the March 12, 1979 report, "Background Information on the Railroad of Western Europe and Japan," by John Fischer of the Congressional Research Service, "This has been in part a result of significant improvements to its equipment, allowing for higher speed operations."

The average speed needed to make rail service viable is primarily dependent on the travel time of competing modes. The total trip must be fast enough to provide an incentive for travelers to leave the train's major competitor--the automobile. Service on the successful high-speed trains in France, Britain, and Japan is comparable to the airlines. The average speed of their trains is over 100 miles per hour. At a minimum, service in the United States must be comparable to the passenger operations in those countries.

Another important factor is the frequency of service. In order to provide the traveler with convenient service, trains should be operated almost hourly and with service to all major intermediate points. Infrequent service does not allow most travelers the flexibility and freedom they need when planning trips. Amtrak President Alan Boyd echoed these views when he stated at the July 23, 1981 Joint

Economic Committee hearing that, "Experience in the Northeast corridor has proven that people will leave their cars and take the train on trips of generally 100-300 miles if they are provided frequent, reliable, safe, and comfortable service."

The final major factor which needs to be considered in developing a competitive passenger rail system is the population density in the area served. In order to generate enough ridership, a route must not only connect two major cities, but also serve a heavily-populated region which includes a number of intermediate-sized cities. The high-speed trains in Europe and Japan run through the most densely populated areas in the country. In addition to the Northeast Corridor (Boston-Washington, D.C.), there are a number of regions in the U.S. where population densities approach the levels in Europe and Japan. These include:

(1) Atlanta, GA, to Nashville, TN.
(2) Atlanta, GA, to Savannah, GA.
(3) Boston, MA, to New York, NY, to Washington, D.C.
(4) Boston, MA, to Springfield, MA, to New Haven, CT.
(5) Cleveland, OH, to Columbus, OH, to Cincinnati, OH.
(6) Chicago, IL, to Indianapolis, IN, to Cincinnati, OH.
(7) Chicago, IL, to Cleveland, OH.
(8) Chicago, IL, to Detroit, MI.
(9) Chicago, IL, to St. Louis, MO.
(10) Chicago, IL, to Milwaukee, WI.
(11) Los Angeles, CA, to Las Vagas, NV.
(12) Los Angeles, CA, to San Diego, CA.

(13) San Jose (Bay Area), CA, to Sacramento, CA, to Reno, NV.

(14) Miami, FL, to Jacksonville, FL.

(15) New York, NY, to Albany, NY, to Buffalo, NY.

(16) Philadelphia, PA, to Atlantic City, NJ.

(17) Philadelphia, PA, to Harrisburg, PA.

(18) Seattle, WA, to Portland, OR.

(19) Houston, TX, to Dallas-Ft. Worth, TX, to San Antonio, TX (the Texas Triangle).

(20) Washington, DC, to Richmond, VA.

* Recommendation No. 2: Separate Passenger and Freight Operations.

The Japanese Shinkansen and the French TGV have demonstrated the need for and benefits of operating freight and passenger trains on separate tracks. Separate operations provide the most reliable and fastest passenger service because they eliminate the problems associated with the different track, signal, and operating requirements of passenger and freight operations. America's freight railroads would also be able to operate at maximum efficiency because they would not have to invest in maintenance projects or make operational changes which primarily benefit passenger operations and add little to improving freight movements.

Attempts to run a high-speed passenger operation over existing track in the United States would prove unsuccessful because of track conditions and freight train interference.

As Amtrak President Alan Boyd pointed out in a recent article:

> There is no way we can run adequate passenger service on the existing track network designed to accommodate very heavy freight operations. Yet even if tomorrow Superman should arrive bearing magic wear-proof metals from Krypton, Amtrak could not provide modern passenger service over the freight lines that now exist... because fast passenger trains would inevitably be stacked-up behind the twenty-mile-per-hour freights.

In many cases, the problem of freight train interference results not from a purposeful attempt by private railroads to sabotage passenger rail operations, but as an outgrowth of the present system. Since freight traffic is their main source of revenue, private railroads often give it precedence over passenger operations. In addition, the long length of some freight trains prevents them from pulling onto a siding to allow a passenger train to pass.

The biggest problem associated with the development of a passenger system on separate tracks is acquiring the necessary right of way. A number of options are available. One option is to purchase under-utilized rights of way currently owned by the freight railroads; indeed, every opportunity for consolidation of existing activities and rights of way should be explored and encouraged before new rights of way are sought. Ownership could be transferred to Amtrak, State agencies, or a regional rail authority comprised of a number of neighboring States. Another option is to use, when possible, the median strip or other property connected with the interstate highway system.

Recommendation No. 3: Utilize Advanced Railroad Technology. *

The development of a modern, high-speed passenger rail system could be undertaken quickly and easily in the United States because of the availability of proven, advanced technological systems. The passenger railroads in Britain, France, and Japan have already developed and implemented major new advances in railroad technology. These countries and other European nations also conduct continuing research programs which will provide rail technology for the future. The innovations and designs which have been developed in those countries should be transferred to the U.S. passenger railroad system.

Currently, the British, French, and Japanese are in the final stages of testing trains which can travel at speeds higher than any passenger trains operating in the United States, without sacrificing passenger comfort. The French TGV recently set a world speed record of 236 miles per hour. When that train goes into regular service, however, the top operating speed will be 160 miles per hour. The Japanese will soon put into revenue service a modified "Bullet Train" which has reached speeds of 197 miles per hour. Both the Japanese and French trains were designed to operate on new tracks developed specifically for the new high-speed operations. The British APT (Advanced Passenger Train) was designed to travel at a top speed of 160 miles per hour on existing track through the use of an electronically controlled body-tilt system.

The Europeans and Japanese have also made significant advances in the track and signal systems. The Japanese have designed and constructed an advanced track design called "slab track." In this track system, concrete and cement are used in the roadbed in place of ballast. Slab track has been found to reduce maintenance and improve the quality of the ride. According to some railroad authorities, slab track is essential for future high-speed lines. The Japanese have also used concrete in the construction of bridges and viaducts to reduce noise and vibration.

The engineers of trains running at very high speeds must rely on advanced and precise signal systems. The most advanced system is called Automatic Train Control (ATC). Under this system, the trains are operated by means of a single signal inside the cab which indicates the speed at which the trains must run and provides for automatic operation of the trains. When near stations, however, the trains are operated manually.

The West German and Japanese governments are already investing in what may be the trains of tomorrow: magnetic levitation or maglev systems. In these systems, the moving train never touches the track. The train rides on a cushion of air and is propelled by magnetic force. In December of 1979, at the Miyazaki Test Track in southern Japan, a prototype magnetically levitated vehicle reached a speed of 309 miles per hour. The West Germans hope to market magnetically levitated vehicles internationally by 1985.

Recommendation No. 4: Electrify the Rail Lines.

To the extent possible, high-speed passenger trains should be electrically powered. Operating at full capacity, electric trains are the most energy efficient form of transportation in terms of passenger miles per gallon. In addition, the United States could relieve its dependence on foreign energy sources because the electrified railroads could get their electricity from coal, gas, hydro, or nuclear power plants.

The energy efficiency of passenger railroads in general is superior to other modes of transportation. On the average, high-speed trains operate at 1.5 to 3 times the efficiency per passenger of the automobile, and 4 times more efficiently than the airplane.

Studies by the Japanese indicate the tremendous potential energy savings that can result from the development of an electric high-speed passenger rail system. In 1977, the Shinkansen carried 124 million passengers and consumed the energy equivalent of 4.4 million barrels of crude oil. Had the Shinkansen passengers made their trips by automobile, they would have used 20.6 million barrels of gasoline, or about 46 million barrels of crude oil. During testimony before Congress in late 1979, the President of the Japanese National Railway, Mr. Fumio Takagi, stated that the Shinkansen system saved the people of Japan more than 40 million barrels of oil in 1977. Today, that savings would amount to about $1.2 billion.

Electrically-powered railroads are also desirable from a business and environmental perspective because they are quieter, cleaner, and more reliable than diesel engines. These factors allow the railroad company to save about 25-30 percent on the costs of operation, including fuel. Compared to the automobile, electric railroads are practically non-polluting. Based on the energy, environmental, and operational benefits of electric railroads, Japan and Europe operate electric trains almost exclusively on their high-speed routes.

Recommendation No. 5: Eliminate Grade Crossings.

In order to allow for high-speed operations and to ensure maximum safety for the rail passengers and the general public, passenger trains should operate over tracks on which there are no grade crossings. High-speed trains which operate on well-maintained track without grade crossings are completely safe. This has been proven on the Shinkansen where over 1.5 billion passengers have been transported since 1964 without a single fatality.

The elimination of grade crossings would also enable trains to operate at higher average speeds and shorter schedules. Many trains are required to reduce their operating speeds when they approach grade crossings located within city limits. By eliminating the possibility of grade crossing accidents, train speeds could safely be increased. Elimination of grade crossings is unavoidably costly, but must be done to assure the safety and efficiency of our rail transit system.

Recommendation No. 6: Business, Labor, and Government Should Cooperate in Project Planning, Finance and Operations.*

The cooperative efforts of business, labor, and government will be required in all phases of a project of this magnitude and importance. Regardless of how the passenger rail system is financed or operated, the success of the project will depend on the support and coordination of all three parties. Cooperation will be necessary in financing and operating the system, and in obtaining public support for and use of the system.

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* Senator William Proxmire states: "While I fully support the goal of revitalizing the passenger rail transportation system, I believe that it can and should be accomplished without the use of Federal funds or subsidies. The Federal Government can play a useful role in helping the planning and coordination of private efforts to achieve this goal."

In obtaining financing for right of way acquisition, grade crossing elimination, track construction, electrification, and car manufacturing, all financial resources should be explored, including both private and public sources. One set of options includes Federal and State government financing. Capital formation and operating costs for transportation systems have been financed by governments through three principal sources: (1) intergovernmental aid, including Federal-State matching funds, (2) publicly offered bond issues, and (3) current tax and non-tax receipts.

The potential demand for high-speed railroads is great enough in heavily-populated corridors in the United States that the project may be a profitable private investment. Therefore, serious consideration should be given to private financing or joint ventures involving public and private sources. The Japanese have already proven that high-speed passenger trains can be profitable. When the President of the Japanese National Railways, Mr. Fumio Takagi, spoke to Members of both Houses of Congress late in 1979, he reported that the Shinkansen system had grossed $3 billion in 1978 with total overall expenses of $1.7 billion. The French government and some private investors have also recognized the potential for profitable service. The French TGV system, which cost $1.5 billion, is self-financed by the French National Railways and by loans floated in France and other countries, including the United States.

Studies of the development of transportation systems during America's period of growth and analyses of future demand also point to potentially profitable high-speed passenger rail systems in America. As previously discussed, rail service will become more attractive in the future as petroleum supplies become more scarce, automobile travel becomes less comfortable due to poor road conditions and reduced vehicle size, and transportation costs increase. At the July 23, 1981, Joint Economic Committee hearing on passenger rail, Harvard Professor of Business, Dr. Albro Martin, testified that, "Every real new innovation in the technique or the art of transporting people in modern times has, in turn, created its own market. It has done that very successfully and, in general, each of these innovations has made money for considerable periods of time." Martin said that the development of a high-speed passenger rail system would provide the same results. At that same Joint Economic Committee hearing, Amtrak President Alan Boyd testified that the preliminary conclusion of a study by Amtrak indicates that high-speed trains can be profitable in this country. Boyd added that, if the study's conclusions proved true, American trains should be able to attract private investment, eliminating the need for any direct Federal operating subsidy for high-speed service.

The construction and operation of a high-speed passenger rail system would, however, involve the taking of substantial initial risk by private business. One way in which the public and private sectors can cooperate in gaining the confidence in the project needed to obtain private financing is through government loan guarantees. Federal loan guarantees could be available for projects where a corridor development plan was considered economically viable by the Secretary of Transportation. In this way, routes would only be constructed in corridors where the foreseeable traffic could generate enough revenues to repay the loan. This type of financing arrangement would not require the expenditure of any Federal funds.

Cooperative efforts between business and labor will also be necessary in order to negotiate fair and equitable labor contracts for the workers involved in the construction and operation of the system. Federal, State, and local governments should also work closely with industry officials to avoid unnecessary and excessive regulations.

Recommendation No. 7: Appoint a Rail Corridor Development Expediter in the Executive Office of the President.

The President should appoint a Rail Corridor Development Expediter to be responsible for notifying the President and the Congress of any administrative, legislative, or financial problems, so that remedial action could be promptly taken. The Expediter should also serve as the coordinator of activities involving business, labor and government. The Rail Corridor Development Expediter should be located in the Executive Office of the President in order to ensure that problems will be responded to quickly and at the appropriate level of authority. Placing the Expediter in the Executive Office would also demonstrate, to the public and those directly involved in the project, the national importance assigned to the development of a high-speed passenger rail system.

Recommendation No. 8: Promote Domestic Jobs and Production.

The development of a high-speed passenger railroad system in the United States should, whenever possible and consistent with our international obligations, employ American workers and domestic means of production. The construction and operation of the rail system by American business and labor would add impetus to the Nation's reindustrialization program. The railroad project would not only create a new major industry, fostering new employment and business opportunities, but would also help to revitalize the areas served by the high-speed trains.

The beneficial economic effect of the development of a high-speed railroad system is tremendous. The construction of a 247 mile stretch of Shinkansen meant thousands of jobs for Japanese industry and workers. The civil engineering and track work for the project required the work of 219 frime contractors, 500 subcontractors, and 550 manufacturing companies. Even more firms were involved in electrical work for the project. In this phase of development, 346 primary contractors, 500 subcontractors, and 1,500 manufacturers participated. The manufacturing of rolling stock utilized the additional efforts of 23 primary contractors and 500 subcontractors. When complete, the project had consumed 286 million cubic feet of concrete, 2.45 million tons of cement, 279 million cubic feet of aggregate, 580,000 tons of steel and iron, and 8,930,000 kilowatt hours of electricity.

The development of an American high-speed passenger rail system could have an effect on the U.S. economy similar to the Japanese experience. The opportunity exists to create a new rail technology industry and promote growth in the energy production and basic industry sectors of the United States. There would be an infusion of capital into depressed industries and technology transfers to many parts of the economy. Now that much of the Nation's highway construction is complete, the highway construction industry's talents and capabilities could be used in grading, building bridges, pouring concrete, and building fences and stations for a new rail transportation system. In his July 23, 1981 testimony before the Joint Economic Committee, Mr. James Snyder, Legislative Chairman of the Brotherhood of Railway and Labor Executives, estimated that the development of a national high-speed rail system would result in the creation of 60,000 new jobs.

In his July 23, 1981, Joint Economic Committee testimony, ORTA Executive Director Robert Casey estimated that the proposed 15 year, 547 mile construction project will require 46,000 work years of jobs, involving more than 8,000 direct employees. Considering the multiplier effect, job creation will swell to 150,000 work years. The total construction cost of $5.7 billion could result in $20 billion in total economic impact on the State's economy. After the project is completed, 2,700 permanent employees will be needed to run the system. It is quite possible that this level of activity could be duplicated in 20 corridors throughout the United States.

The presence of a new transportation system would also revitalize the local economies in the region served by the trains. At 30 public meetings throughout the country held by Amtrak to discuss the potential for high-speed rail corridors, public officials and other community members spoke enthusiastically about the economic benefits that development of the corridors could have. Those community views are summarized in the April, 1981 Amtrak "Emerging Corridor" report. Speakers at the San Diego meeting, for example, stressed that the existing rail service between San Diego and Los Angeles has become vital to the economic well-being of the entire area. Many of the participants at the meeting expressed the conviction that renewed rail passenger service would encourage the growth of business and reinvestment in downtown areas, and would greatly increase tourism, in addition to meeting daily business commuter needs.

The construction and operation of a high-speed passenger rail system could play a vital role in reversing America's economic decline. In his July 23, 1981 testimony, Dr. Albro Martin, from the Harvard Graduate School of Business, told the Members of the Joint Economic Committee that a high-speed rail system will cause a better America to emerge by the end of the century:

> ...because such is the fabulous history of the building of the American railroad system. In the older, settled part of the Nation, the first railroads quickly created the industrial and commercial world that was the pride of most Americans until quite recently, and the envy of the rest of the world... Only with high-speed ground transportation can we create the environment and free up the resources necessary to build super-modern America."*

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* Because of deadline considerations, Senator Lloyd Bentsen was not able to take part in the preparation of this study and hence is unable to join it.

SUPPLEMENTARY VIEWS OF
REPRESENTATIVE GILLIS W. LONG

With a few specific reservations set out below, I endorse the findings and general thrust of this report.

I am especially pleased by the Committee's call for a balanced transportation policy, promoting the most efficient and economical modes for each given region or locality. I am further heartened by the Report's recognition that the weaknesses apparent in the national transportation network represent a national problem, and, as such, require the cooperative efforts of business, labor, and Federal and local governments to find feasible remedies.

In that the Report sets out to address passenger rail issues, I am disappointed that the problems faced by 85 million Americans living in small towns and rural areas are given virtually no consideration.

The deterioration of all forms of rural transportation has been well documented, and provoked a long-overdue Federal response in the nature of President Carter's 1979 rural transportation initiatives. The needs outlined at that time are just as critical today. Rural and small town Americans are experiencing growing social and economic isolation from their fellow citizens as public transit systems decline, roads deteriorate, rail branch lines are abandoned, commuter air service disappears, and the costs of gasoline rise.

Meanwhile, many such communities in the Sunbelt states are simultaneously facing the increased pressures of absorbing new industry and population under the strains of an already inadequate social infrastructure.

Changing population and commercial settlement patterns, especially in the new growth areas of the South and West, require that we adopt a flexible transportation policy responsive to differing requirements and differing potentials for transportation.

My specific reservations regarding this Report's recommendations include the following:

1. High-speed rail systems, especially those modeled on foreign examples, are largely inappropriate for the vast majority of American communities. Unlike Japan, France, and Britain, the United States does not enjoy the relative luxury (in transportation terms) of a compact territory with densely populated cities. Thus, the Report's conclusions are of little value for rural areas, or even for small towns in between large cities. Any attempt to include such towns in a high-speed system would necessarily defeat its primary purpose.

2. The "economically viable" criterion for determining Federal financing priorities inherently favors high-density urban transit systems over essential rural systems. As the Report itself states, "routes would only be constructed in corridors where the foreseeable traffic could generate enough revenues to repay the loan." While this sounds appealing on its face, we must remember that much vital commerce in this Nation, both freight and passenger, travels through rural areas, and to smaller communities. Small town access to the nationwide network must be given serious weight in any plan for Federal financial support for passenger rail.

3. I oppose the creation of a special Rail Corridor Development Expediter in the Executive Branch. As the title implies, this person would represent only a segment of the transportation constituencies in this country--the urban corridor segment. It is

better to retain advocacy for transportation policy in the Department of Transportation where all regions are represented, and where any specific plans which do emerge will hopefully be part of a larger, integrated national policy.

4. The Report's recommendation of the elimination of all grade crossings may make sense when viewed solely from the perspective of enhancing high-speed rail service. However, I am concerned that too little attention has been given to the impact on local communities of such a requirement, both in terms of new construction and the disruption of existing patterns of commerce and traffic.

Despite these reservations, I commend the Report for its willingness to draw on the experiences of other systems in an attempt to find solutions to the very real problems afflicting urban transportation. I trust the Committee will pursue this line of inquiry through further hearings and reports on the range of transportation issues and challenges confronting our country.

For these, and the reasons given above, I endorse this Report.

ADDITIONAL VIEWS OF CONGRESSMEN
CLARENCE J. BROWN
AND
JOHN H. ROUSSELOT

We support efforts to increase investment in our transportation infrastructure. Obviously improved passenger transportation can add to the comfort and leisure time of traveling Americans. The benefits of improved transportation are potentially more far reaching, however. High-speed transportation provides busy and highly productive people with additional time to be used in producing goods and services. Perhaps more important, a good freight transportation system can lower the costs of distributing goods, making American business more competitive in the world economy. Thus any efforts to improve passenger transportation should not lose sight of the vital importance of freight transport to the American economy as well.

In this connection, we think the scope of this Report is too narrow: increased investment in our transportation system should not be confined to passenger rail service alone. Freight transportation should receive equal concern. But more than that, rail transport should be weighed in light of an overall transportation system. For example, the Report quite correctly mentions the deterioration in our interstate highway system, and it seems to us equally desirable to improve this form of transportation capital that has carried a far greater number of passengers in recent years than the railroads. Many Americans live in areas with relatively low population densities for which no form of high-speed rail transit is likely to be economically viable. Even in highly populated states like Ohio and California, the highway system is likely to remain a prominent transportation mode even if a high-speed rail system were implemented. Therefore, we must address the problem of our deteriorating highways. Anyone who has traveled on the expressways of Britain, France, Germany or Japan knows that even where superior rail transportation exists, a large volume of traffic is still carried by automobile.

Along the same lines, the large size of the United States makes airplane transportation far more sensible than rail transport for long distance travel, unlike in such small, densely populated countries as Britain and Japan where all trips are for relatively short distances. Consequently, improvements in airports and related forms of aviation capital are important to future expansion of our total transportation stock. We are not saying that we should not seriously explore the possibility of a high-speed rail network: what we are saying is that we should not limit our policy initiatives exclusively to this one form of transport.

Too often the Federal Government has subsidized well intentioned programs that make little sense on a cost-benefit basis. Before committing ourselves to a costly high-speed transport system financed in part with public funds, we must seek more evidence that passenger demand for an improved rail system is likely to be of sufficient magnitude that the investment can be made without a massive sustained raid on the Federal Treasury. We need more statistical evidence relating to the experience of nations such as Japan and France that are pursuing high-speed rail transportation programs. We need to find out more definitively if a superior rail passenger system can ever hope to be financially viable in this country and, if so, where?

In this connection, we note that the Federal Government's experience in attempting to improve rail service to this point has not been terribly encouraging. Americans traveled far fewer passenger miles by rail in 1980 than in 1965, despite the fact that in 1980 we spent $823 million subsidizing Amtrak, whereas in 1965, we spent nothing. To be sure, any new initiatives in passenger rail transport must be imaginative and innovative. Also they should be based on a realistic evaluation of passenger demand as well as operating and capital costs. We are not opposed to passenger rail improvements and believe they probably have a place in the much needed revitalization of America. At the same time, however, we hope we do not lose sight of economic realities.

The eighth recommendation of the Committee's report suggests that one of the benefits of a high-speed rail system is that jobs will be created. Even since the WPA days of the thirties, the argument has been advanced that we can reduce unemployment through more Federal public works spendings. Despite increasingly large doses of this medicine, the unemployment "disease" never seems to be cured. Moreover, the argument that a new rail transportation system will create jobs can be made with regard to virtually any form of government spending. The building of highways, airports and water shipping docks creates jobs, too. The decision to build or not to build an improved rail transportation system should concentrate on the long-run contribution that such a system can make to America's economic growth, not to any questionable, short-run effects that such a program might have on employment.

Despite our concerns about some of the specifics of the recommendations in the Report, we strongly agree with the basic premise underlying it and previous reports of the Committee, namely that we must seek to increase our rate of economic growth by raising productivity and increasing the creation of new resources. Utilizing new forms of technology to improve rail transportation is vital to this task, and this Report outlines one proposal that deserves our serious consideration as we start on the path towards economic recovery and revitalization.

MAG-LEV FAX SHEET

1. Proposed to FAA for Dulles-Washington use in June 1981. No action by FAA yet.

2. Foreign Systems are predicated on the use of existing tracks and facilities.

3. Mag-Lev.

   - No wheel to rail contact.
   - No friction metal to metal.
   - Flight at ground level.
   - Does not require transmission of energy from the track.
   - Active motors built under the track.
   - Minimal environmental impact.
   - Mag-Lev is quiet.
   - Maybe used over existing highways.
   - Goes weather or not.
   - Low land acquisition costs.
   - Perhaps state compacts should be formed to "balanced out" the financing, examples: Mid-America compact, Southeast, etc.
   - From 1957-1976 the U.S. spent 75 billion for highways vs. one billion from railroads.

4. Why Budd?

   - Fifty years experience in rail car building.
   - Budd holds the land speed record with its track under the LIM vehicle (Linear Induction Motor).

- Fifteen years ago Budd built equipment which was tested and demonstrated at 160 mph. (some actually went 174).

- Budd exports rail technology to foreign countries.

5. From an energy standpoint Mag-Lev is better than highway, rail or air models.

6. In a projected 27 Km system the energy used would be less than a 60 watt light bulb per seat.

7. What is the energy consumption on a seat mile per k/w hour basis?

   A. There does not yet exist model data to give a good answer. You need the system parameters to give a meaningful answer.

      - System length
      - Passenger density
      - Tapographic constraints
      - Number of stations
      - Hours of operation
      - Transport volume
      - Desired speed

8. What are the costs per mile of the overhead guideway?

   A. They will vary as a function of the terrain, gradient, curvature, etc. Each proposed system must be analyzed on an individual basis. This is no different than the methods used for highway construction.

9. What maintenance facilities are required to operate the system?

   A. Covered shunting yard, power sub-station, and central control system.

10. What is the general elevation of the guideway from the ground?

    A. For safety reasons about 16½ feet from ground level. This height is a minimum for road crossings underneath and at the same time considered high enough not to be climbed easily.

    Guideway costs depend on the length of the guideway, beams and the height of elevation.

11. Do the beams need frequent re-alignment?

    A. They should be inspected by test vehicle once each month. But this normal maintenance of right of way should be true of conventional railroads as well.

12. In case of power failure, how is emergency egress of passengers accomplished?

    1. Passengers remain on vehicle until it is repaired.
    2. If there is no possibility to drive on, a special vehicle pull or pushes to the next station.
    3. Passengers may leave thru exit doors.
    4. The last possibility is the use of emergency shutes, similar to aircraft egress.

13. What are the effects of snow or ice?

    A. The Hamburg experience showed no problem. The major propulsion stator is mounted in the covered portion of the beam. The vehicle will also have the same chemical ice elimination systems used at airports.

14. How is the system contracted?

    A. Both manual and automatic control is possible. On automatically controlled telecommand system with terminals permits the exchange of data and commands between the control station and the vehicle.

    A multi-channel communication system with sound and unidirectional video from the vehicle links the control station with various peripheral points.

    The actual and the limiting speed are computed on the vehicle. The mechanical brake is activated automatically if the limiting speed is exceeded.

15. What is the meantime between failure?

    A. Proof of reliability, availability and expected lifetime of components and subsystems is one of the objectives of the Ernslored equipment.

16. How is track side power transferred to the vehicle for heating, air conditioning, etc.?

    A. The required on-board power is generated by linear generators. Ni-Cod 440V battery provides the on-board power when the linear generator is not active e.g. at low speeds.

17. How is the vehicle detected in the system?

    A. From fixed points along the guideway, and thru the slotted-wave-guide to the control station.

18. What are the effects of aerodynamic left at high speeds?

    A. The amplitudes are small and do not affect the ride comfort.

19. What are the general characteristics of the vehicle?

    - Electromagnetic suspension and guidance in modular construction of autonomous units.

    - Synchronous long-stator motor fed by power stations.

    - On-board power supply by linear generators and a buffer battery system.

    - Two independent brake systems.

        A. Braking by the long stator motor
        B. Braking by the magnet wheels
        C. Emergency landing skids at magnets

20. The passenger car is designed according to aerodynamic principles for high-speed and minimum cross winds susceptibility. The body is supported by "trucks" via hydropneumatic springs. The magnets are made of rare earth cobalt.

21. Can this system "stand along"?

    A. Absolutely, but we recommend interface with existing bus, rail or airport facilities for passenger accumulation and distribution.

22. How fast can this system be built?

    A. Because of its construction simplicity, it can be on-stream faster than conventional high-speed rail systems.

    This is a proven technology that can be applied to future transportation requirements. Only feasability studies for specific applications can provide the economic data and then only for that system.

23. Mag-Lev appears to be enormously expensive. Who pays the cost?

    A. The "Report of the Joint Economic Committee Congress of the United States, November 3, 1981" said in recommendation No. 6 - Page 26 - "

"In obtaining financing for right of way acquisition, grade crossing elimination, track construction, electrification, and car manufacturing, all financial resources should be explored, including both private and public sources. One set of options includes Federal and State government financing. Capital formation and operating costs for transportation systems have been financed by governments through three principal sources: (1) intergovernmental aid, including Federal-State matching funds, (2) publicly offered bond issues, and (3) current tax and non-tax receipts.

The Potential demand for high-speed railroads is great enough in heavily-populated corridors in the United States that the project may be a profitable private investment. Therefore, serious consideration should be given to private financing or joint ventures involving public and private sources.

The construction and operation of a high-speed passenger rail system would, however, involve the taking of substantial initial risk by private business. One way in which the public and private sectors can cooperate in gaining the confidence in the project needed to obtain private financing is through government loan guarantees, Federal loan guarantees could be available for projects where a corridor development plan was considered economically viable by the Secretary of Transportation. In this way, routes would only be constructed in corridors where the foreseeable traffic could generate enough revenues to repay the loan. This type of financing arrangement would not require the expenditure of any Federal funds.

Cooperative efforts between business and labor will also be necessary in order to negotiate fair and equitable labor contracts for the workers involved in the construction and operation of the system. Federal, State, and local governments should also work closely with industry officials to avoid unnecessary and excessive regulations."

24. What is The Budd Company's role in this?

A. Budd has survived as American's only rail passenger car manufacture because of its innovations from the 1931 introduction of a stainless steel vehicle to its 1980's introduction of the SPV-2000

We know passenger railroads, we know technology. Our specific role maybe anything from system management to car construction.

25. Why did you chose to introduce Mag-Lev at this time?

    A. Mag-Lev has been unfairly overshadowed by the conventional high-speed developments in Europe and the Far East. Planners must be aware of what else is available.

P. O. Sichert
November 13, 1981

POS/gaa

Mr. **Glickman**. Thank you, Mr. Dickhart.

Let me ask you a few questions. First of all, where are we in terms of the state-of-the-art of Skytrain technology? You have showed us the German track. You said that it had run before. Are we pretty close to being ready to move ahead with this?

Mr. **Dickhart**. Yes, we are. The development of the German maglev system, the 06 system, is complete. The vehicle, as I showed you, the 200-passenger vehicle, is nearing completion. The test track will be complete and ready for engagement of the vehicle in the late summer. So what remains at this point is demonstration of the system at the full speed. Now, in 1979, I also showed you a slide of the 05 vehicle, which was the first maglev vehicle that was licensed to carry passengers. During the exhibition the 05 vehicle carried some 50,000 or 60,000 people. So the technology is in place. It is ready to be exploited.

Mr. **Glickman**. What speed are you talking about?

Mr. **Dickhart**. 250 miles an hour. That is 400 kilometers per hour. So it is a quantum jump beyond the speeds that we are talking for high-speed rail.

Mr. **Glickman**. And what kind of cost are you talking about? Let us say a construction on a per mile basis.

Mr. **Dickhart**. The best information we have at this point is that it is comparable to high speed rail. Now, of course, we will have complete data on this when we finish the study for Las Vegas, because in that study we are going to be comparing construction costs for both a high-speed rail system and a superspeed, or a maglev system. So we will have a direct comparison there and, of course, costs are very site-specific. It is difficult to deal in generalities.

Another factor that enters into this, as your speed goes up, you require fewer vehicles to accomplish the same mission. You may be comparing little apples and oranges. You need to compare on the specific site and for specific service, and that is exactly what we will be doing in Las Vegas. The best information we have now comes from Germany, and it is from the studies of the demonstration system that is being put in and the studies that have been conducted by France and Germany of systems between Frankfurt and Paris. The data has not been published at this point, but the information that we have indicates that the cost, the construction costs for high-speed rail and maglev are comparable.

There are some advantages that weigh in favor of maglev. It is not limited by adhesion, so that you have a tremendous hill-climbing capability, and especially in the terrain where the grades exceed that which you can do with conventional rail, you can have a much shorter route by using the maglev. You can clinch grades of 10 percent. That is feasible with maglev.

Mr. **Glickman**. Are there any negatives to it in terms of maintenance, operation, or environmental effects?

Mr. **Dickhart**. The answer to every one of those is certainly not negative.

Mr. **Sichert**. In some situations you do not need a Cadillac to drive to the supermarket. The trains operated by Amtrak may be sufficient. If you are reaching to connect point A and B at a lower operating cost, then maglev clearly should be given the opportunity.

Mr. **Glickman**. Are there any negatives on the technology of the maglev?

Mr. **Dickhart**. No.

Mr. **Glickman**. As I understand it, you will be on an elevated constructed track all the way through.

Mr. **Dickhart**. Just as the proposed Los Angeles-San Diego rail system will be.

Mr. **Glickman**. OK. Amtrak is moving on the Los Angeles-San Diego high-speed line through the American High Speed Rail Corp. They apparently have decided that the Shinkansen or the Japanese-style train is one they would like to pursue at this time. Will this preclude you and other U.S. companies from bidding on the system?

Mr. **Sichert**. If we understand the testimony in relation to the Los Angeles-San Diego, that is correct. We believe in fair competition, and we would like to see the maglev system be given equal opportunity.

Mr. **Glickman**. Their concern is they want to go out now and raise money. Apparently they have gotten some commitments from Japanese investors or the Government of Japan. They do not think they can do it unless they utilize technology that does not need to be demonstrated further. There may be a point in that, but I do not want to jeopardize———

Mr. **Sichert**. We think Mr. Gilson presented a good case in the situation between Los Angeles and San Diego. We feel there may be other corridors not quite that ready. We have a lot of American jobs at stake, American jobs to produce this, UAW, Teamster, and Steelworker jobs, and we would like to have those people be given fair opportunity to compete in an open sense.

Mr. **Glickman**. You are still making rail cars?

Mr. **Dickhart**. Yes, sir.

Mr. **Glickman**. Would you conceivably be selling the conventional rail cars that might be used on a bullet train line, or would those be manufactured by a Japanese company?

Mr. **Sichert**. It is difficult for us to draw that conclusion, but I think that you might take a sensible guess and say that they probably will be of Japanese origin. We do make conventional trains, and the 164 an hour Metroliners were made by Budd as well as most of the Amtrak fleet.

Mr. **Glickman**. Regarding the bullet-train technology, there is no reason why the Budd Co. could not make cars that would run on those tracks; is that correct?

Mr. **Dickhart**. That is correct.

Mr. **Glickman**. I saw that bullet train run. I assume you would have the technological capability to develop cars to meet their specifications.

Mr. **Dickhart**. Absolutely. As Paul indicated, we demonstrated that in the Metroliner. The reason it did not operate at 160 miles an hour was it did not have the right-of-way capable of sustaining those speeds, so it operated at 120 miles an hour.

Mr. **Glickman**. At limited parts of those routes?

Mr. **Dickhart**. Wherever the portion of the route allowed it. I think the point that we are trying to make here is regardless of which bullet-train technology is used in this country, whether it be the Japanese bullet train, the French bullet train, or the U.S. bullet train, we do have the technology to do it. As I pointed out, we set the world speed record, so we have the high-speed technology available. I could discuss vehicle dynamics with you at length. That is not our purpose. We want to talk about Skytrain. Regardless of which of these bullet-train technologies you choose, it is going to require a new right-of-way that is separate from the existing freight infrastructure if you are to attain the 150- 160-mile per hour operations that we see in Japan and France. If you are going to have to have a new separated right-of-way, certainly consider Maglev, because instead of 150 or 160 miles an hour, we are talking 250 miles an hour, and from the best information we have, comparable costs. So from a passenger ridership standpoint, all the studies would indicate that the higher speed that you can operate, the more people you are going to attract from the other modes.

Mr. GLICKMAN. How many people—you said 200 passengers?

Mr. DICKHART. Yes. The demonstration train is a two-car train; each car holds 100 passengers.

Mr. GLICKMAN. Is there any reason why that could not be increased in size?

Mr. DICKHART. No; it is just a question of adding more cars.

Mr. GLICKMAN. I think the Japanese said that their bullet trains accommodate over 1,000 people.

Mr. DICKHART. Sure. They are 8 or 10 cars long.

Mr. GLICKMAN. Do you believe that we in the United States are behind the technology curve in U.S. rail passenger transport technology?

Mr. DICKHART. Certainly behind in the application of the technology curve, but not behind as far as the technology itself is concerned. I believe that in this country, and I could spend time talking about what we have done vehicle dynamicswise. Two weeks ago I attended a test between New Haven and Boston of a new tilt system that the Budd Co. has developed which was demonstrated where we went 10, 15, 20 miles an hour faster than the current operating speeds around curves and showing how this new tilt system will provide passenger comfort at higher speeds. Now, it is not only applicable in the Northeast Corridor, that principle is applicable anyplace—actually it fits on Amfleet equipment. So we are state of the art, but we certainly hide it. We do not publicize it as some of the offshore people do.

Mr. GLICKMAN. That is a tilt system to go on existing cars?

Mr. DICKHART. To go on existing cars to raise the speed about 20 percent around curves.

Mr. GLICKMAN. Did that get much play in the press or did you publicize it?

Mr. DICKHART. No. What we did was the first test or the first demonstration of it. Now it will go into extended tests in June. This is a program sponsored by the Northeast Corridor, the Department of Transportation and Amtrak, and the Budd Co. Everyone has contributed to it.

The first demonstration was very successful. It will go on to extensive tests. The concept is that it can be retrofit on existing Amfleet cars. There is nothing like it in the world.

I personally was involved in the study with the Department of Transportation reviewing all the technology in the world to see if we could get something that would fit in these cars. There is nothing else available.

So we have something here that is beyond what is available.

Mr. **Glickman**. We saw Japanese photos or visual displays of their mag-lev system currently demonstrated.

How would you relate that or compare it to the one you are talking about and what is the comparable state of technology ?

Mr. **Dickhart**. I would like to address that. I guess the big difference is that the development of the German system is complete, whereas, as was indicated this morning in the testimony, the Japanese system is still under development.

Now, a number of the principles that are used are the same but the way they are being used are different.

As I pointed out to you, in the German system the vehicle actually wraps around the guideway and the levitation magnets are underneath. It lifts up off the guideway and in case of an emergency, and all power fails and what not, you will come back down on the guideway. There is no way to get off.

The Japanese system started out with a guide track that was down the middle and I think it was in the pictures that we saw this morning, although it was difficult to look up and over that system. They have changed that system.

They are in the process of modifying it now and going to a U-shaped guideway. Their levitation magnets are on the bottom of the vehicle so that it floats by repulsion between the magnets.

The linear motor is quite similar in principle but in detail it is quite different. The German linear motor is one that has been designed to be mass produced and produced very inexpensively and I think that accounts for part of the comment that we heard in this morning's testimony of the expense of the Japanese mag-lev system compared to high-speed rail. But they are coming along.

They have indicated that by the end of the eighties they will have a system. We believe it will be quite similar to what the Germans have now. We like the fact that the mag-lev, as they indicated, is the system of the future in their estimation.

Mr. **Glickman**. Except for you, however, no domestic company is doing any work on mag-lev?

Mr. **Sichert**. There are no domestic companies. We are the last U.S. railway passenger car builder, unfortunately.

Mr. **Glickman**. You know, you call yourself a sister company to a German company. I wonder, are you owned by this company?

Mr. **Shirar**. Let me address that.

Mr. **Dickhart**. Yes.

Mr. **Shirar**. Thyssen A.G. is a German company and it has four major companies. One of them is the Budd Co., which is a U.S.-based company. The Budd Co. has about 15,000 employees at the present time. We have one German executive who is the coordinator or interface between Thyssen A.G., the parent, and the Budd Co.; that is, all we have is one individual. We are a U.S. company.

Mr. **Glickman**. No, I don't object to that. What I am saying, though, is that it used to be a publicly held company and now your stock is held by whom?

Mr. SHIRAR. By Thyssen A.G. We have one shareholder.

Mr. GLICKMAN. I want to see you succeed and employ American people. From a historical point of view it is unfortunate, and this is a value judgment I am making, that the last remaining railroad company in America is not owned by American stockholders. That is just a fact of life. That has happened even in my agricultural area.

We have the Heston Corp. in Kansas that is now owned by Fiat. Because of economic considerations, things have happened that way.

Mr. SICHERT. You are absolutely right, Mr. Chairman, neither are the A. & P. or Saks Fifth Ave. or Shell Oil Co., but they are all American.

Mr. SHIRAR. The Thyssen Henschel organization is a subsidiary of the three German companies, one of the four that is owned by Thyssen A.G.

We exchange technology with them quite frequently.

Mr. GLICKMAN. It is obvious that if you were not affiliated with them that no one would be doing any mag-lev work for the technology to be transfered into this country.

The reason I am bringing this up is that yesterday we had some discussion by a representative of General Electric about the ability of U.S. manufacturers to have any input in the manufacturing process overseas. Today the gentleman from the French National Railroads disputed that and I thought he made a pretty articulate case.

I suppose one of our concerns in terms of this whole technology area is the fact that all of the technology seems to be developing outside this country's borders, which is fine. If we are not doing it, somebody will be doing it, but I hate to see what I call restrictive trade practices which prevent U.S. manufacturers from participating in manufacturing overseas.

That is a reality that we have to face in so many areas that we compete with. You had a comment on that?

Mr. SICHERT. You are absolutely right and in a conversation with Mr. Scher after the meeting in a correction to his correction, the companies supplying that equipment are all based in France.

Mr. GLICKMAN. Why don't you elaborate on that.

Mr. SICHERT. It was ITT France, for example.

Mr. GLICKMAN. Well, they are affiliated with American companies.

Mr. SICHERT. Absolutely.

Mr. GLICKMAN. But they were their French affiliates is what you are saying?

Mr. SICHERT. Exactly.

Mr. GLICKMAN. I have been a very strong advocate for unrestricted trade, but the more I stay here in this place and the more I look at our industrial base, the more I see us being abused and taken advantage of by other governments and I don't like it. It is not fair.

Mr. SICHERT. Could I synthesize, sir, a little statement?

Recently we lost an order as the U.S. rail industry to Kawasaki in New York. If Budd had won that contract, 90 percent of that work would have been performed in the United States versus 43 percent that the NYMTA indicates that Kawasaki will have.

By using factors from the Wharton Economic Forecasting, a well-respected group out of the University of Pennsylvania, we estimate that the overall impact to our economy will be determined as follows: $129.1 million of U.S. content will be lost—which translates into a loss of $284 million of gross national product, $92.3 million of Federal tax revenue, and $8.9 million of State and local tax revenue.

I am just amplifying your point, sir. Thank you.

Mr. **Glickman**. Let me ask you this. Kawasaki won a bid, is this subway cars?

Mr. **Sichert**. Yes. The point we are trying to make, sir, is the point that we believe in free and fair trade. What was lacking here, of course, was the financing in that particular situation.

Mr. **Shirar**. Our unit cost was lower than the Japanese unit cost. The financing package did us in.

Mr. **Glickman**. And the financing package was supplied by whom?

Mr. **Sichert**. The Export-Import Bank of Japan.

Mr. **Glickman**. You mean the interest rates the city of New York would pay would have been less?

Mr. **Sichert**. It is the State of New York, sir. It is a very complicated situation. It contains no Federal money per se. The illustrative example is to indicate the American industry is prepared to do this. It does not have the financing in the commuter car or subway car industry but as the proponents of mag-lev with serious American employment in jeopardy we would do our very, very best to employ as full a scope of union American employees as possible.

Mr. **Glickman**. You know this administration wants to cut back our comparable tool. We make a lot of airplanes in my hometown and they are financed through that Export-Import Bank and it just has reached the scale of absurdity to think that nobody else is thinking about doing that in the name of fiscal austerity but I won't ask you to comment on that.

Mr. **Sichert**. Thank you, sir.

Mr. **Glickman**. I appreciate your testimony. I hope that you will keep the committee as informed as possible on the state of mag-lev, the state of the art, and some of us may be going over to Japan in June where we will have a chance to look at a Japanese system, but I just encourage you to keep us informed.

Mr. **Dickhart**. Yes; what we would like to do, Mr. Chairman, is when we have the results of the Las Vegas study, to get that information back to you, and, as soon as the German mag-lev system is in some sort of operating condition, we would like to extend an invitation to you, and the committee to visit Germany and see the system in operation.

I would also like, at some point, to have an opportunity to come back and tell you what Budd Co. is doing in conventional rail technology because the technology is not all overseas.

I think if you have a chance to talk to Steve Teel, your minority technical consultant, just a little bit he can give you some of the background of the things that we are doing.

I believe it might be valuable and interesting if we would have the opportunity to come back at a future hearing and elaborate on U.S. high-speed rail technology.

Mr. **Glickman**. Sure. Thank you very much for your testimony.

Our next witness is Mr. John Parke Wright, chairman of the Florida High Speed Rail Committee.

Mr. Wright, it is a pleasure to welcome you here. As you, of course, know, the chairman of the Science and Technology Committee Mr. Fuqua, is from your own State.

Go ahead and proceed as you wish. Your entire statement will appear in the record so you may proceed to summarize in whatever way you would like.

STATEMENT OF JOHN PARKE WRIGHT, CHAIRMAN, FLORIDA HIGH SPEED RAIL COMMITTEE

Mr. **Wright**. Thank you, Chairman Glickman, and members of the committee.

I will not read into the testimony my full statement as you have copies before you. However, I do wish to enter into the record the executive order of Governor Bob Graham, which establishes the Florida High Speed Rail Committee.

Mr. **Glickman**. That will be a part of your formal testimony?

Mr. **Wright**. That is correct, yes.

Mr. **Glickman**. Proceed.

Mr. **Wright**. I am chairman of the Florida High Speed Rail Committee. I am also a director and vice president of Lykes Brothers, Inc., a privately owned family company whose business was established in Florida in 1851.

Following 8 years of living in the Far East, recently in the countries of China, Japan and Hong Kong, working with the British firm of Jardine, Matheson & Co., who, in fact, pioneered the first railroads in China and Japan in the 1800's. I recently returned to Florida to continue to develop my Lykes family business activities.

Having lived and worked in Japan and having utilized the Japanese Shinkansen bullet train on a regular basis, I have found on returning to Florida that we have significant opportunity for similar modern means of transportation systems as have been developed in Japan and other parts of the world.

I welcome this opportunity to speak before you today and to report on the progress that our committee has made in recent weeks in trying to mobilize our efforts.

Our key concern today is in maintaining and enhancing the quality of life in Florida and, at the same time, strengthening our economic base.

With Florida's rapid growth over the last 10 years, increasing more than 43 percent, and with the fact that into our State each year come over 30 million tourists, increasing the population by three times just through tourism, we feel that we are looking straight at a future transportation problem and, unless we begin to address ourselves today to the problems of tomorrow, we are going to be in a very difficult position in the future.

What we have done throughout the State is to form a mobilized blue ribbon committee. We formed a coalition of leadership from the urban and agricultural areas of the State. Following the Governor's executive order, we are charged with, but not limited to, carrying out a fair study on the opportunity to create a new high speed rail transportation system in our State.

The system I speak of which is new to this country and, as you have heard from Japan, France, and Great Britain, is a system that if put into place will affect our quality of life and will be of great service to alleviate transportation problems that we are facing.

The first line segment planned for Florida is over an L-shape pattern terminating in Tampa and Miami with Orlando at the apex.

If you refer to this map you will get an image of the first phase idea.

May I stand and address this?

Mr. GLICKMAN. Sure, go ahead.

Mr. WRIGHT. We have in place in the State existing highway corridors, and interstate systems, consisting of four- and six-lane highway corridors. For example, from Tampa to Orlando is a very modern and efficient highway system, and a similar system exists from Orlando down to Miami. Of course, Miami, with southeast Florida, is a major metropolitan area, and the Tampa west coast area is a major port facility and industrial base, as well as, again, a major metropolitan area which is growing from the Clearwater area down to Fort Myers, thereby having in place one large megalopolis area that is now in the working stages of defining itself as one human base.

Orlando, with the difficulties facing any complex and intense growth area in this part of the State, is on a growth pattern that is quite spectacular.

As you know, our agricultural area is down the center of the State. We consider this, even today, somewhat remote in terms of community development. One of the key aspects of this plan is that as we have overdevelopment in some areas of our coastal areas, by making the remote areas of the State quickly accessible to the economic and urban areas, we feel we will be able to foster some of the growth further inland into what are now remote areas.

I would like to refer to the opening of Disney's EPCOT system, the Experimental Prototype Community of Tomorrow, which will open October 1st of this year. This represents a significant investment in central Florida of over $800 million by the Disney organization. It is forecasted that EPCOT will draw into the State over 20 million visitors alone in 1983.

Such an advanced high speed rail system, therefore, would be, in fact, a logical extension of the EPCOT concept bringing tomorrow's future transportation systems into reality today.

For nearly a decade we have all been very concerned about the availability of petroleum and how a disruption in supply could have a devastating influence on the ability of the Nation or our State to maintain equilibrium.

Passenger rail service can provide a partial answer, we feel, to this dilemma.

From a business point of view, we believe that significant economic benefits to our State will result with the construction and ongoing operation of a high speed rail system.

The construction industry will be challenged to meet the charge of building such a project and increased employment will result.

A new service industry will be created, and when the system is in place, this will create thousands of new jobs throughout the State. The intense population and economic growth in our State has occurred mostly along, as I have said, our coastal areas, and we need to alleviate this problem as quickly as we can.

In short, business will benefit and the quality of life will be enhanced. We are encouraged by the formation of the American High Speed Rail Corporation and their interest in our State. As private enterprise pioneered the great railways across America, we look to the future, encouraging that same spirit of free enterprise and hard work from the private sector.

We are impressed by the accomplishment of the Japanese National Railways and their high speed rail system which has been in operation since 1964. We would hope that through cooperation with Japan in the form of technology exchange and low interest project financing, that this project will become a symbol of economic and technological cooperation between our two countries.

With a current trade imbalance in Japan's favor to the tune of $18 billion, we would hope that Japan would see this type of a cooperative project as one way to reinvest profits derived from exports to America back into America, with Japanese financing and low interest rate participation on an ongoing basis as one method of reencouraging cooperation between our two countries, as opposed to direct head-on competition.

In conclusion, we do look to you, Mr. Chairman, and your committee for your support and in the efforts of the private sector together with cooperation of the Federal and State agencies involved.

We have, in Florida, existing right of way legislation which allows us to participate and use the right of way of the State's existing road systems. We hope that the Federal highway system would also be available to us for right of way.

In the State of Florida we will work hard to achieve a modern high speed rail system as a future solution to serious transportation problems that we know will result if left unattended today. So we have a lot of work and we would look forward to cooperating with your committee and working with you in this effort.

Mr. GLICKMAN. Thank you very much, Mr. Wright.

I am just curious, has the newly formed High Speed Rail Corporation been in touch with the Governor or Florida's High Speed Rail Committee? Have they been in touch with you at all?

Mr. WRIGHT. Yes, in November of 1981, I accompanied Governor Graham to Japan on an economic mission. Previous to going out and having the idea for a high speed rail system in our State, as I have said, I called Alan Boyd of Amtrak and we discussed it. Mr. Boyd and I went to see the Governor upon our return from Japan and we began a dialogue as to investigating this opportunity in cooperation with Amtrak and their newly formed American High Speed Rail Corporation.

We see them as a good possible candidate for, I guess, really undertaking the responsibility to design, engineer, construct, own and operate a modern high speed rail system in our State.

We encourage their active interest as well as the interest shown in Japan, Great Britain, and France.

Mr. **Glickman**. Do you think that this high-speed rail corridor can be financed privately or do you think Government guaranteed loans or other Government assistance is going to be necessary?

Mr. **Wright**. At this point in time as we are just commencing a feasibility study, it is somewhat early to really bring to bear the possibility of its financing viability.

However, having said that, some of our preliminary thoughts and investigations do indicate that there could be a good chance that a modern system in our State could be a profit line, if you will. In thinking of the bottom line, we feel that our friends in Japan, with financial cooperation, could be a good solution to financing the project. We hope that the private sector group that would participate in this activity would have the courage to go forward if their studies prove positive.

Mr. **Glickman**. I am informed that the city of Miami is implementing a rail transit and people moving system under Federal funding from the Urban Mass Transit Administration. There has been some reluctance on the part of the Federal Government to fund more than the initial segments and that it does not appear that Miami or the State will pick up the tab for further expansion.

Now, I am not sure what the current status, but given that, do you think that the State of Florida, either directly or through the issuance of bonds or through some other funding mechanisms might be in the business of picking up some of the funding of this?

Mr. **Wright**. In the case of Miami, I am somewhat concerned there becuase that is a city and State project with Federal funding. It is not a private sector enterprise. Sometimes when these great projects get underway in that fashion the contruction time lags on as it has in this case, thus causing great cost overruns.

One would wish that they would be thinking of the bottom line in terms of getting on with that work. They have had some problems on the project.

However, if you take the State and you look at the Tampa area, we do need a modern people-moving system, similar to the one we are trying to implement in Miami.

If you take the opportunity for the Disney relationship and the Orlando jetport which has just been finished, linked into the urban growth of Orlando, you could have three people-moving type city metro systems feeding a major bullet train line or express system and they could be very much urban related.

That would give us an urban intercity to urban intercity connecting point that would be quite convenient.

Mr. **Glickman**. Let me ask you, how many people live, let's say, from Miami up the coast through and including Orlando? Are you talking about 5 million people?

Mr. **Wright**. You are talking about 5½ million from the corridor of Orlando to the west coast of Florida and serving the west coast, and about 6 million from Orlando to southeast Florida. You have got some concentrated areas. The key, of course, is in 1980, 32½ million people visited our area as tourists. About 13 million went to Disney and next year about 20 million will go to the Orlando area alone.

We see a deterioration already in the quality of life in terms of transportation problems that are beginning to surface and we hope that by looking ahead we can try to strengthen and enhance our quality of life.

Mr. GLICKMAN. What is this EPCOT that you mentioned? I know the Disney Experimental Prototype Community of Tomorrow. What is it?

Mr. WRIGHT. It is an $860 million capital investment over a several thousand acre tract of land adjacent to the Disney World Theme Park. Before the death of Walt Disney, he master-planned a place that he called the Experimental Prototype Community of Tomorrow. He created two sections in this master plan. One is called Future World whereby he has taken the concept of future technology, with leading corporations in America participating.

There is the Energy Future Technology Center on the grounds which Exxon is backing. Transportation Future Technology Center, which has General Motors involvement. Agricultural Future Technology Center of Tomorrow, which Kraft is involved; and what they are calling Spaceship Earth, which is about an 18-story round universe which A.T. & T. has engineered and is a part of.

New technology of the future is the key and alternatives to technology decisions for the future and for problem-solving is really the objective.

Mr. GLICKMAN. So it will be more than a display then?

Mr. WRIGHT. It is a real concept of the future of this country and our lifestyles.

Mr. GLICKMAN. Will there be actually technological work going on there then?

Mr. WRIGHT. There will be a continual updating of technology that is being displayed and reviewed by the companies mentioned and others.

Also alined with this is what they call a World Showcase, which is the first international permanent exposition, with participation from countries all over the world. There will be a major Japan Pavilion, an American Pavilion, of course, a People's Republic of China Pavilion, Germany, France, Italy, et cetera, and there they are focusing on tourism, trade, culture, art, and their technology.

It is an impressive center.

Mr. GLICKMAN. It is kind of a permanent world's fair, then, in a sense?

Mr. WRIGHT. In a sense, but with the creativity of Walt Disney it seems to be a little bit beyond that.

We are excited in the State of Florida because of the encouragement it gives to the private sector and the citizens of the State to really think ahead and to look ahead as a community group where we do have a lot of very strong community communications and leadership in the State. The private sector working very closely with our elected officials. It is encouraging that we have this good relationship and we can go forward.

Mr. GLICKMAN. I asked you a little bit before about your contact with the American High Speed Rail Corporation. Do you have plans to discuss the feasibility of the Florida corridor with Japanese National Railways directly?

Mr. WRIGHT. We have had discussions with our friends in Japan. The Governor and I had the opportunity to meet with Ambassador

Mansfield last year, and to meet with officials of Japan National Railways.

We were allowed to drive the train. We had a great ride to Kyoto. Having lived there, as I mentioned, we appreciate the efficiency of the system. We just hope it is applicable to our own problem-solving efforts. However, the door is open.

Great Britain and France have serious interests in America and in these projects. However, we would hope that the competitiveness of the three or whatever competing groups would give us the best deal for the State of Florida.

Mr. **Glickman**. Let me ask you a final question. You are a businessman. I will put on my parochial hat for a moment since I represent an area of the country where roughly half the airplanes are made.

Do you think that this kind of a system would, in any way, interfere with American aviation which tends to dominate the world in terms of production of airplanes?

That is, if, in fact, we make a mag-lev system that can go 250 miles an hour, would it have a severe impact on aviation? Most airplane flights are 500 miles or less in this country.

I wonder if you might respond to that?

Mr. **Wright**. I would like to put your mind quickly at ease because in the State of Florida, we have two of the finest airports on Earth: the Tampa International Airport and the Orlando Jetport designed by J. E. Greiner & Co. These two airports, in our opinion, are the finest in the world. Miami, of course, is the international center for all of the Caribbean and Latin America and a number of international flights that are beginning to mushroom out of the Miami area into the South and Central America and Caribbean areas.

There is just very good air business there.

In terms of Tampa and Orlando, again, with the EPCOT draw and the Disney draw those airports are facing some of their brightest times assuming that world travel will grow and increase and Florida will become more a part of the international community.

So, if you consider as well that there is not a lot of air travel between Tampa and Orlando at this point, but there is from Miami to Orlando and Miami to Tampa, I would feel that just the growth of the State and the business would maintain the airline industries.

Mr. **Glickman**. I guess my concern is that the new generation of aircraft in commuter business as well as in commercial aircraft is tending to emphasize again the routes between 300 and 500 miles, and 300 and 600 miles.

I guess it is just an important consideration that we will have to consider in the event that the Federal Government decides to progressively get involved in this business and that is that we don't operate in an abstract world here.

We could be interfering, conceivably, with the future manufacturing of airplanes over the next 20 or 30 years.

Mr. **Wright**. We would hope, as well, that we would not have to come before Congress to ask for appropriations of funding. We would hope that this could be handled by the private sector in our own responsibilities.

Though our company has no interest wishing to avoid conflict of interest possibilities, our participation is from a community point of view. We feel what is good for the State is good for our business, and it is just a good, positive community effort.

We are thinking, as well, listening to the Budd Co. representatives, that we hope there would be cooperation between our industry and companies in America with their counterparts in Japan, Germany, and Great Britain and to, so to speak, aline on this one and not to compete too directly head on.

We thought of an idea, discussing it, for example, to put a maglev system from the Kennedy Space Center, linking into the Orlando EPCOT line. It is about a 60-mile run. It could be a very interesting prototype and, again, extending the EPCOT future transportation systems out from what is now a theme park to what we hope will be a new and more modern State of Florida.

Mr. **Glickman**. We thank you very much for coming down here. We wish you good luck.

Mr. **Wright**. Very good.

[The prepared statement of Mr. Wright and additional material follow:]

TESTIMONY BEFORE THE
UNITED STATES HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUB-COMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

BY
JOHN PARKE WRIGHT, CHAIRMAN
FLORIDA HIGH SPEED RAIL COMMITTEE
APRIL 6, 1982

MR. CHAIRMAN, HONORABLE MEMBERS OF THE COMMITTEE, MY NAME IS JOHN PARKE WRIGHT. I AM CHAIRMAN OF THE FLORIDA HIGH SPEED RAIL COMMITTEE, RECENTLY APPOINTED AND ANNOUNCED BY GOVERNOR BOB GRAHAM OF FLORIDA. I AM ALSO A DIRECTOR AND VICE PRESIDENT OF LYKES BROS. INC., A PRIVATE FAMILY-OWNED COMPANY, WHOSE BUSINESS ACTIVITIES IN FLORIDA DATE BACK TO 1851.

FOLLOWING EIGHT YEARS OF INTERNATIONAL WORK IN JAPAN, CHINA, AND HONG KONG WITH THE BRITISH FIRM OF JARDINE, MATHESON AND COMPANY, WHICH PIONEERED THE FIRST RAILROADS IN CHINA AND JAPAN IN THE 1800'S, I RECENTLY RETURNED TO FLORIDA TO CONTINUE TO DEVELOP MY LYKES FAMILY BUSINESS ACTIVITIES.

HAVING LIVED AND WORKED IN JAPAN, AND HAVING UTILIZED THE JAPANESE SHINKANSEN BULLET TRAIN ON A REGULAR BASIS, I HAVE FOUND, IN RETURNING TO FLORIDA, THAT A SIMILAR HIGH SPEED RAIL SYSTEM FOR OUR STATE COULD HAVE SIGNIFICANT POSITIVE ECONOMIC AND SOCIAL IMPACT ON THE CITIZENS OF THE STATE OF FLORIDA.

I WELCOME THE OPPORTUNITY TO SPEAK BEFORE THIS COMMITTEE ON THE PROGRESS WE IN FLORIDA HAVE MADE IN OUR INVESTIGATION OF THE POTENTIAL FOR THE DEVELOPMENT OF STATE-OF-THE-ART PASSENGER RAIL SERVICE BETWEEN OUR MAJOR URBANIZED AREAS. THIS INSTALLATION, WHICH IS WITHIN OUR GRASP, MAY VERY WELL BE THE PROTOTYPE FOR LINKING THE STATES WITHIN THE UNITED STATES. I AM SURE THAT YOU CAN APPRECIATE THAT THE SYSTEM WE ENVISION WILL REPRESENT A BREAKTHROUGH IN SURFACE TRANSPORTATION FOR THIS COUNTRY. IT OFFERS US, AT LAST, A BALANCED SYSTEM; AN ALTERNATIVE TO HIGHWAY AND AIR TRAVEL WHICH IS BOTH MORE ENERGY EFFICIENT AND TIME EFFICIENT.

PARTICULARLY CRITICAL FOR FLORIDA IS THE FACT THAT HIGH SPEED RAIL WILL ALSO CONSERVE ONE OF OUR MOST PRECIOUS RESOURCES - LAND.

THE SYSTEM I SPEAK OF, WHICH IT IS NEW TO THIS COUNTRY, IS THE RESULT OF PROVEN TECHNOLOGY DEVELOPED AND IN USE IN OTHER LANDS. AS YOU HAVE HEARD DURING THESE HEARINGS, HIGH SPEED TRAINS ARE CURRENTLY OPERATING IN JAPAN, FRANCE AND GREAT BRITAIN AT MAXIMUM SPEED OF 160 MILES PER HOUR. THIS TECHNOLOGY CAN WORK EQUALLY WELL IN FLORIDA.

THE FIRST LINE SEGMENT PLANNED FOR FLORIDA IS OVER AN ELL-SHAPED PATTERN, TERMINATING IN TAMPA AND MIAMI, WITH ORLANDO AT THE APEX. (SEE VISUAL AID) A MAJOR POTENTIAL STATION ON THIS ROUTE WILL BE THE DISNEY EPCOT COMPLEX SOUTHWEST OF ORLANDO. THE DISTANCE FROM MAIMI TO ORLANDO IS 215 MILES. IT IS 80 MILES FROM TAMPA TO ORLANDO. WE BELIEVE THAT THIS ROUTE OFFERS MANY SIGNIFICANT ADVANTAGES OVER OTHER AREAS OF THE COUNTRY FOR THE PROTOTYPE INSTALLATION. FOR ONE THING, IT IS RELATIVELY FLAT. THIS IS A DEFINITE PLUS FOR A SYSTEM HAVING SUCH HIGH OPERATIONAL SPEEDS. NOT ONLY DOES IT MINIMIZE SEVERE VERTICAL CURVES, AND HEAVY GRADES, IT LESSENS THE NEED TO BY-PASS TOPOGRAPHIC OBSTACLES WHICH INTRODUCES INEFFICIENT SHARP HORIZONTAL CURVES INTO THE ROUTE. EQUALLY IMPORTANT AS TOPOGRAPHY ARE WEATHER CONSIDERATIONS. THE INCIDENCE OF SEVERE WINTER WEATHER THAT COULD DISRUPT SERVICE OR DAMAGE FACILITIES ELSEWHERE IS UNRECORDED IN THIS AREA. IN ADDITION TO THOSE IDEAL CONDITIONS WHICH ARE CONDUCIVE TO RAIL SERVICE, WE CAN BENEFIT FROM PREVIOUSLY CONSTRUCTED TRANSPORTATION ARTERIES BETWEEN THE THREE CITIES. WE HOPE TO BUILD THE RAIL LINES UPON THE RIGHT-OF-WAY NOW EXISTING FOR INTERSTATE ROUTE 4 AND THE FLORIDA TURNPIKE. RIGHT-OF-WAY LEGISLATION IN FLORIDA IS ALREADY ESTABLISHED, AND WE WOULD HOPE THAT FEDERAL REGULATIONS WOULD SUPPORT THIS EFFORT.

NOT ONLY IS FLORIDA IDEAL FOR A RAIL SYSTEM IN THIS CORRIDOR, BUT WE WILL BE ABLE TO DRAW UPON THE FASTEST GROWING MARKETS IN THE COUNTRY. AS YOU ARE AWARE, FLORIDA'S POPULATION HAS GROWN PHENOMENALLY IN RECENT YEARS.

IN THE LAST TEN YEARS, WE HAVE GROWN MORE THAN FORTY-THREE PERCENT. EACH YEAR, WE ARE ADDING MORE THAN A QUARTER MILLION RESIDENTS. THE URBANIZED AREAS LINKED BY THE PROPOSED FIRST PHASE OF THE HIGH SPEED RAIL SYSTEM CONTAIN NEARLY 5-1/2 MILLION PEOPLE. NOT ONLY IS FLORIDA'S POPULATION LARGE AND GROWING, IT IS VERY MOBILE. THE LEVEL OF HIGHWAY USE IN FLORIDA RANKS THIRD IN THE NATION, ALTHOUGH WE ARE ONLY SEVENTH IN POPULATION.

SUPERIMPOSED UPON THE HOME MARKET IS THE TOURISM SECTOR OF OUR ECONOMY, THE LARGEST SINGLE INDUSTRY IN THE STATE. THE TOTAL NUMBER OF PEOPLE VISITING FLORIDA IN 1980 WAS 32½ MILLION, THREE TIMES THE RESIDENT POPULATION. AS MANY AS HALF OF THESE VISITED THE AREA TO BE SERVED BY THE MIAMI-ORLANDO-TAMPA HIGH SPEED RAIL (HSR) SEGMENT.

WITH THE COMPLETION AND OPENING OF DISNEY'S EPCOT (EXPERIMENTAL PROTOTYPE COMMUNITY OF TOMORROW) ON OCTOBER 1ST OF THIS YEAR, REPRESENTING A SIGNIFICANT INVESTMENT IN CENTRAL FLORIDA, UNPRECEDENTED NUMBERS OF TOURISTS ARE EXPECTED TO VISIT THE AREA FROM 1983 ONWARDS. SUCH AN ADVANCED HIGH SPEED RAIL SYSTEM WOULD, IN FACT, BE AN EXTENSION OF THE EPCOT CONCEPT, BRINGING TOMORROW'S FUTURE TRANSPOTATION SYSTEMS INTO REALITY TODAY.

THE NATURAL ATTRACTION OF FLORIDA, ENHANCED BY THE DEVELOPMENTS TO ENCOURAGE TOURISM, IS UNSURPASSED. THE MARKET FOR EFFICIENT, CONVENIENT, AND ECONOMIC TRANSPORTATION IS HERE. WE BELIEVE THAT WE MUST ACT NOW TO ASSURE THAT THE DEMAND CAN BE SERVED.

FOR NEARLY A DECADE, WE HAVE BEEN CONCERNED ABOUT THE AVAILABLE OF ENERGY, AND HOW A DISRUPTION IN SUPPLY COULD HAVE A DEVASTATING INFLUENCE ON THE ABILITY OF THE NATION AND OUR STATE TO MAINTAIN ECONOMIC EQUILIBRIUM. PASSENGER RAIL SERVICE CAN PROVIDE A PARTIAL ANSWER TO THIS DILEMMA. ON THE ONE HAND, IT CAN PROVIDE MOBILITY AT A FAR LOWER OPERATING ENERGY INPUT PER PASSENGER SEAT MILE THAN AN AIRLINER OR PERSONAL AUTOMOBILE.

ALTHOUGH ALL OF THE MODES HAVE MADE GREAT GAINS IN EFFICIENCY, HIGH SPEED RAIL IS STILL AT LEAST TWICE AS ENERGY-EFFICIENT AS ITS COMPETITION. ANOTHER FEATURE OF THE HIGH SPEED RAIL SERVICE WHICH WE LIKE IS THAT IT PROVIDES MARKET DIVERSITY. EVEN IF WE DON'T HAVE SERIOUS ECONOMIC DISRUPTIONS IN ENERGY, THE RAIL SYSTEM WILL BE IN PLACE, AND BE ABLE TO PROVIDE AN ALTERNATIVE SERVICE TO THOSE CITIZENS AND VISITORS WHO DO NOT WISH TO TRAVEL BY AIR OR HIGHWAY.

ASIDE FROM THE ENERGY ASPECT OF THE PROPOSED RAIL SERVICE, THERE ARE DEFINITE ENVIRONMENTAL BENEFITS TO BE REALIZED. LAND IS SCARCE IN FLORIDA, AND GROWING MORE SO. WE DO NOT HAVE THE FUNDING NECESSARY TO CONTINUALLY ADD CAPACITY TO OUR HIGHWAY SYSTEM. THE LIMITS OF OUR SYSTEM ARE FINITE AND ARE QUITE NEAR. STILL, AS I HAVE SAID, THE DEMAND CONTINUES TO GROW. THE MOST REASONABLE SOLUTION SEEMS TO BE TO INCREASE THE TRAVEL CAPACITY ON EXISTING HIGHWAY CORRIDORS. THIS PASSENGER RAIL SYSTEM DOES JUST THAT. WE EXPECT THAT HIGH SPEED RAIL CAN DRAW SUFFICIENT TRAVEL FROM THE ADJACENT HIGHWAY SO THE ROAD WILL REMAIN OPERATIONALLY SERVICEABLE FOR MANY YEARS WITHOUT THE CONSTRUCTION OF ADDITIONAL TRAFFIC LANES. FURTHER, THE ELECTRIC TRAIN ITSELF WILL BE NON-POLLUTING. THIS IS CRITICAL FOR AREAS SUCH AS TAMPA, WHICH HAVE EXPERIENCED PERIODIC AIR QUALITY PROBLEMS.

FROM A BUSINESS POINT OF VIEW, WE BELIEVE THAT SIGNIFICANT ECONOMIC BENEFITS TO OUR STATE WILL RESULT WITH THE CONSTRUCTION AND ON-GOING OPERATION OF A HIGH SPEED RAIL SYSTEM. THE CONSTRUCTION INDUSTRY WILL BE CHALLENGED TO MEET THE CHARGE OF BUILDING SUCH A PROJECT, AND INCREASED EMPLOYMENT WILL RESULT. A NEW SERVICE INDUSTRY WILL BE CREATED WHEN THE SYSTEM IS IN PLACE, CREATING THOUSANDS OF NEW JOB POSITIONS.

THE INTENSE POPULATION AND ECONOMIC GROWTH IN OUR STATE HAS OCCURRED MOSTLY ALONG OUR COASTAL AREAS, PLACING STRAINS OF OVER-DEVELOPMENT UPON OUR HIGH QUALITY OF LIFE AREAS.

WITH COST EFFICIENT AND RAPID TRANSPORTATION ACCESS TO THE INTERIOR OF OUR STATE AND THE ORLANDO AREA - NEW RESIDENTIAL URBAN AREAS WILL BE ENCOURAGED ALONG OUR INTERSTATE AND TURNPIKE CORRIDORS. THE AREA OF OUR ECONOMIC ZONES WILL BE EXPANDED TO INCLUDE AREAS THAT WERE PREVIOUSLY REMOTE.

IN SHORT, BUSINESS WILL BENEFIT, AND THE QUALITY OF LIFE WILL BE ENHANCED.

WE ARE ENCOURAGED BY THE FORMATION OF THE AMERICAN HIGH SPEED RAIL CORPORATION AND THEIR INTEREST IN OUR STATE. AS PRIVATE ENTERPRISE PIONEERED THE GREAT RAILROADS ACROSS AMERICA, WE LOOK TO THE FUTURE, ENCOURAGING THAT SAME SPIRIT OF FREE ENTERPRISE AND HARD WORK FROM THE PRIVATE SECTOR.

WE ARE IMPRESSED BY THE ACCOMPLISHMENTS OF THE JAPANESE NATIONAL RAILWAYS AND THEIR HIGH SPEED RAIL SYSTEM, WHICH HAS BEEN IN OPERATION SINCE 1964. WE WOULD HOPE THAT THROUGH COOPERATION WITH JAPAN IN THE FORM OF TECHNOLOGY EXCHANGE AND LOW INTEREST PROJECT FINANCING, THIS PROJECT WILL BECOME A SYMBOL OF ECONOMIC AND TECHNOLOGICAL COOPERATION BETWEEN OUR TWO COUNTRIES.

WITH THE CURRENT SERIOUS TRADE IMBALANCE BETWEEN OUR TWO COUNTRIES - A COOPERATIVE EFFORT OF THIS TYPE TO DESIGN, ENGINEER AND CONSTRUCT HIGH SPEED RAIL SYSTEMS IN THIS COUNTRY WOULD BEGIN TO REGENERATE BACK INTO AMERICA PROFITS AND CAPITAL DERIVED FROM PREVIOUS EXPORTS TO AMERICA, THUS WORKING TO RE-ESTABLISH A BALANCE OF TRADE WITH JAPAN. I BELIEVE JAPAN SEES THIS PROJECT OPPORTUNITY AS A SYMBOL OF FUTURE COOPERATION WITH THE UNITED STATES.

IN CONCLUSION, WE LOOK TO YOU, MR. CHAIRMAN, AND YOUR COMMITTEE FOR YOUR SUPPORT OF THE EFFORTS IN THE PRIVATE SECTOR, TOGETHER WITH THE COOPERATION OF THE FEDERAL AND STATE AGENCIES INVOLVED - TO GO FORWARD IN ESTABLISHING HIGH SPEED RAIL SYSTEMS IN AMERICA.

IN THE STATE OF FLORIDA, WE WILL WORK HARD TO ACHIEVE A MODERN HIGH SPEED RAIL SYSTEM AS A FUTURE SOLUTION TO SERIOUS TRANSPORTATION PROBLEMS THAT WE KNOW WILL RESULT IF LEFT UNATTENDED TODAY.

State of Florida

OFFICE OF THE GOVERNOR

EXECUTIVE ORDER NUMBER 82-34

WHEREAS, access to timely and efficient modes of passenger transportation is essential for Florida's intercity travelers and visitors if the State's quality of life and economy are to continue to improve, and

WHEREAS, it is recognized that the geography of the State of Florida is suitable for the construction and efficient operation of an electrical high speed rail system, and

WHEREAS, high speed rail systems are more energy efficient than other passenger modes, would alleviate congestion of other modes, would preclude the need for major public expenditures for additional highway capacity in the future, and would improve mobility to the benefit of Florida's taxpayers and tourists, and

WHEREAS, private enterprise has expressed interest in determining the feasibility and profitability of a high speed rail system in Florida,

NOW, THEREFORE, I, BOB GRAHAM, as Governor of Florida, pursuant to the Constitution and Laws of the State of Florida, do hereby promulgate the following Executive Order, effective immediately:

Section 1.

The Florida High Speed Rail Committee is hereby created to serve for a period from April 15, 1982 through June 30, 1985 for the purpose of determining the feasibility of a privately owned and operated high speed rail system. The Committee is charged with performing the following tasks:

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1. Determine the public benefit likely to accrue from the establishment of high speed rail service.

2. Determine the market and engineering feasibility of such a system, including route location and priorities.

3. Establish design and construction specifications and criteria.

4. Determine the feasibility of utilizing existing publicly owned rights-of-way for high speed rail service and,

if found feasible, prepare requests for proposals for the leasing of same.

5. Prepare requests for proposals for franchising the design, construction, operation and maintenance of the system to a private entity or entities.

Section 2.

The composition and number of committee members shall be determined by the Governor. Committee members shall be appointed by the Governor and shall continue to serve at the pleasure of the Governor.

Section 3.

Committee members shall not receive remuneration for their services, but members other than public officers and employees shall be reimbursed by the Department of Transportation for travel or per diem expenses in accordance with Section 112.061, Florida Statutes. Public officers and employees shall be reimbursed by their respective agencies in accordance with Section 112.061, Florida Statutes. The Committee shall receive direct staff support as necessary from the Department of Transportation with supplemental assistance from other agencies under the Governor's direct supervision and such additional assistance as is appropriate from the Office of the Governor.

Section 4.

The Committee shall report to the Governor every ninety (90) days to update its progress and recommendations.

IN TESTIMONY WHEREOF, I have
hereunto set my hand and caused
the Great Seal of the State of
Florida to be affixed at
Tallahassee, the Capitol, this
5th day of April 1982.

GOVERNOR

ATTEST:

SECRETARY OF STATE

Mr. GLICKMAN. Our last witness today is Dr. Thomas R. Webb, director of development and senior economist at Dalton, Dalton & Newport.

Dr. Webb, it is a pleasure to have you here. We have your full statement which will be included in the record in its entirety. So you may feel free to summarize in any way you desire.

I am sorry that you are the last one but we are moving along as fast as we can. Besides, you said the airport is closed anyway?

STATEMENT OF DR. THOMAS R. WEBB, DIRECTOR OF DEVELOPMENT, DALTON, DALTON & NEWPORT

Dr. WEBB. That is right, so while I have plenty of time, I will keep my remarks short.

The last 2 days have been very interesting for me and I am sure for you. Many challenging points of view have been raised.

My paper covers in some depth four major questions: Is there a market for high-speed rail? Will people ride it? What are the system characteristics that will allow high-speed rail to be successful? What are the probable economic impacts from building and operating a high-speed rail system? What are the public and private financing alternatives?

I will let the paper stand on its own and just cover a few of the key points. I do not discuss technology much because my background is in marketing, economics, and finance. People much more familiar with technology than I have already spoken.

I believe, and most of the other speakers have stated, that it will be the market, economic, and financial factors which are going to determine if we have high-speed rail in our country.

THE MARKET

Is there a market? Are people going to ride high-speed rail? There are three points to it.

First, high-speed rail will meet a particular market niche in the travel market—the 100- to 300-mile trip between major population centers. It is not particularly competitive on either shorter or longer trips. It happens that this one segment of the travel market is not particularly well served by other current transportation systems. It is an opening.

Second, there will be a significant increase in travel demand in the next 20 years. Projections indicate that intercity travel will increase by 119 percent by the year 2000. This is really important because it will determine where the travelers are going to come from for this type of a new travel mode, whether high-speed rail will take a large portion of its riders from this increase in total demand or draw travelers from existing modes.

In Ohio we project a 25-percent increase in trips between cities, from 4.2 billion-passenger miles to 5 billion passenger-miles.

So we have a market niche and we see that there is an increase in travel demand. Will people ride a high-speed rail train? Perhaps the last factor that will determine whether they ride high-speed rail is speed. A person will not ride the train if it goes 80, 120, or 180 miles an hour. People make their decision on some basic commonsense criteria. How long will the trip take door to door? What is the total cost? What is the quality of the service—frequency, convenience, ease of access, safety, reliability, and image? These are the three factors that will determine each travel decision balanced by the characteristics of the person and by the type of trip.

We estimate that at full development the Ohio system would capture about 18 percent of the total travel market. The market share will vary significantly between city pairs. In the corridor between Akron and Cleveland, which is 41 miles, high-speed rail would capture about 5 percent of the market. In the corridor from Cleveland to Columbus, 142 miles, we project that it would capture about 54 percent of the market.

Interestingly, when the full 550 miles is developed, bus trips would still increase by 85 percent and air trips would increase by 28 percent. Only car trips would decline by about 9 percent, but the car would still be used for approximately 75 percent of all trips.

Will people ride the system? There is a market niche. There is an increase in demand. But people will ride the train only if it offers the time, cost and quality of service that is competitive with other modes.

SYSTEM CHARACTERISTICS

That brings us very closely to the second point which is whether you can mix passenger and freight systems together. The answer is obviously yes, you can mix passenger and freight systems together. But, you cannot mix a high-speed passenger system with a freight system. Both are fully integrated systems with special needs. They are two fundamentally different kinds of systems. There are many technical, operational, institutional and market reasons for this conclusion.

Someone with more technical background could summarize the operational and technical issues but they are real. The crux is that both systems are total systems that must be viewed as such, maintenance, signaling, track design, scheduling, car weight, length, safety, speed, are all basically different and they require different solutions.

Yesterday, Mr. Chairman, you mentioned that high-speed rail was not a new and exotic technology and I agree. But it does require a fully integrated technology, with the track, the catenary, the vehicles, the geometry, and the signaling in a single system. It can't be done on a rail that runs 100-ton freight cars at 25 mph.

Institutionally, the systems are different. The rail system in this country is a freight system. It is not a joint system. Freight operations, freight profitability, freight markets, freight priorities are the key to the organizational rewards and the market success of that system. If rail freight is to compete with other freight modes, it must have that viewpoint. If you superimpose a passenger system on top of it, the passenger system can only be a second-class citizen. I think Amtrak essentially proves this point.

The crux is the market. The core issue for a passenger rail system is not speed, it is control. It must control its schedule and its operations or it cannot meet the competitive criteria critical to succeed—time, cost, and quality of service.

ECONOMIC IMPACTS

What is the nature of the economic impacts generated by constructing and operating a high-speed rail system? The simplest answer is big. My paper outlines in detail the construction, operating, and structural impacts from a high-speed rail system.

In Ohio, when you build a $5.7 billion system it has all the characteristics of a large construction program. A total of $18 to $20 billion in total economic impact will be generated.

From my perspective, particularly important is where those impacts will be felt most. Our studies indicate that the construction impacts for the high-speed rail system will have particularly positive impacts on the industrial segments of our economy that need the most help.

I will read just a few. This total aggregate economic impact is: The construction industry, $3.7 billion; chemical and rubber industries, $600 million; primary metal products, $1.2 billion 200 million; fabricated metals, $1.9 billion; machinery, $400 million; wholesale and retail trade, $1.5 billion; households (wages), $4.5 billion. That is a significant economic impact.

FINANCING OPTIONS

How can we finance these high-speed rail corridors? Are there public and private options? Perhaps a more important question is: Can we finance high-speed rail without direct and active public involvement? To me the answer is clearly, no. It has never been done in history. It was not done in Japan. It was not done in France. I don't think that we will be an exception.

Equally important, can there be active and innovative private financing methods used? The answer is with equal enthusiasm, is yes.

The bottom line on any high-speed rail system will be the financing and that financing must be based on the economic viability of each corridor. Each corridor must be evaluated separately. Each will support a different mix of public and private participation on its own unique characteristics.

One of the interesting aspects of high-speed rail is that it does not require a single financing program. In fact, it is far better to fit the financing scheme to the specific project. Let there be some variabilty.

Can we justify public participation? Yes.

Congressman Glickman indicated yesterday that if other transportation modes were saturated we would be able to look at some of the expenditures for high-speed rail as an offset against expenditures required to expand those other government supported travel modes. Also, we have frequently used transportation as a vehicle for stimulating economic growth.

Some say that if foreign governments did it privately, why can't we? I think it is very important to understand that no country did it totally on a private basis. All had major government suppport.

In France, for example, there was a total freight and passenger system on which this development was based. It was a fully integrated system. The French National Government guaranteed all the bonds. Twenty-two percent of passenger revenues in the French system are subsidized by the Government to keep the feeder passenger-line fares low. The French financing plan is not all that dissimilar to a typical tax-exempt municipal financing program from a sewer plant where the revenues from the project pay back those bonds and they are backed by the Government. This could not have been done if the French construction costs were not as low as they indicated at $4 million a mile by avoiding the major construction costs associated with building in urban areas.

Government participation can vary. There are a number of options: Direct subsidy; indirect subsidy in the form of loan guarantees, tax credits, interest rate subsidies; what I call sweeteners such as the new enterprise zone legislation, induced development around stations, and tax increment financing.

There are also some innovative private financing alternatives. We know the system needs to be run as a business, and it should use as much private financing as possible.

The key to any private financing is cash flow, the cash generated over the operating expenditures. If there is a positive cash flow from operations, then you can get private money. If there is not, then you can't.

In any event, Government support would still be needed in some form of a guarantee, in my opinion. There are a number of private financing options that can be considered.

To list a few: Innovative use of depreciation allowances, collateral loans on selected parts of the system; vehicle leasing programs, granting of licenses or concessions for particular profit centers, and vendor/supplier financing.

In Ohio, our projections indicate about a $50 to $55 million surplus of operating revenues over operating costs. That is not close to enough money to finance the development of the total Ohio system. Perhaps it would finance between $500 million and $1 billion of the construction.

The current financing proposal, as Mr. Casey from ORTA indicated, is for 1-percent sales tax for the construction of the system. A 1-percent tax for 15 years would finance the complete construction of 550 miles on a pay-as-you-go basis without any bonds.

On the other hand, early indications for the San Diego-Los Angeles corridor would indicate that it could support a significantly higher proportion of private financing because the operating surplus is much larger. Current estimates show they would need about $200 million in operating surplus to finance the corridor construction wholly with private capital.

Thus, I think it is important to look at each corridor and let the financing plan fit that corridor. I do not see a situation where the Government will not have some form of participation.

In conclusion, Congressman, you asked yesterday if we can have a national high-speed rail system.

My response to you is no, we cannot, and that is critical to the development of Federal policy and programs in this area. With the technology being considered, the market will not accept a national system. The best example was presented by the gentleman who spoke from GE yesterday who presented a series of maps showing high-speed rail corridors in other countries overlaying our country.

What we will have is a series of relatively independent corridors in the 100- to 300-mile length, maybe two, maybe five, maybe ten. We are lucky, because of this nature of high-speed rail. The corridors are generally in separate regions of the country. This will allow for more variability and it should be nurtured.

You face a particular challenge in designing the Federal Government response and role. How do you stimulate the great diversity and entrepreneurship that is taking place in this country, yet design a coherent policy which provides the best response to our overall transportation system needs?

First, we see in high-speed rail the re-emergence of States as entrepreneurs in economic development. This should be encouraged. We should allow diversity. There should not be a single, sole way to do things, at least not right now.

Perhaps a good example would be the emerging corridors of the fifties. We called them turnpikes. They were initially developed by States based on hard economic criteria and they formed the foundation for the building of our nationwide interstate system.

Second, each corridor should stand on its own in market, economic and financial terms. Each corridor will require a different mix of financing, serve different markets, have different institutional and organizational structures. They don't have to all be alike.

Third, we must accept that high-speed rail and freight systems must be separate. They don't mix from any aspect. Each needs control to support its own competitive position.

Fourth, there is a very important role for the Federal Government and national quasi-private companies in high-speed rail. It is critical. We need basic design and safety standards. We need a catalyst, a supporter, an information gatherer, a tester, a loan guaranteer. I think that the new American High-Speed Rail Corporation offers an exciting concept and idea that needs to be pursued. I could even see them constructing and operating some corridors as long as it is not required to be that. It is this kind of balance which is important and will be difficult for you to achieve. Thank you.

[The prepared statement of Dr. Webb follows:]

HIGH SPEED RAIL

MARKET AND ECONOMIC CONSIDERATIONS

Dr. Thomas R. Webb
Dalton·Dalton·Newport

(Remarks before the Science and Technology Subcommittee
on Transportation, Aviation and Materials,
United States House of Representatives)

April 6, 1982

INTRODUCTION

I appreciate the opportunity to speak to you today on one of the most exciting development issues in our country, high speed rail. Across this country there is great foment taking place - excitement, planning, dreaming, and hard work. For the last three years I have been learning and talking about high speed rail. I have presented papers to state legislators, corporate presidents, rotarians, and boy scouts. Their responses have ranged from skepticism to excitement - that grand combination of dream and reality.

The question is not if we are going to have high speed rail in this country, we will in this century. You face a particular challenge in designing the Federal Government response and role in the development of high speed rail. How do you stimulate the great diversity and entrepreneurship which is taking place in this country on high speed rail from California to Pennsylvania; yet, define a coherent policy which provides the best response to our overall transportation systems needs? I hope my remarks will assist you and your colleagues in making these important decisions.

Our firm, Dalton·Dalton·Newport, with an outstanding consultant team, has conducted the most extensive engineering studies of high speed rail in this country for ORTA (Ohio Rail Transportation Authority).*

* Subconsultants to Dalton·Dalton·Newport on the project are: Japan Railway Technical Services of JNR; Peat, Marwick, Mitchell & Co.; Polytech, Inc.; and Transportation and Distribution Associates, Inc.

We have studied, in depth, the other major systems in Britain, France, and Germany. We are working closely and directly with the Japanese. Concurrently, we have completed preliminary studies on marketing and patronage, environmental impacts, institutional issues, and economic effects of building and operating the system in Ohio. I bring to this discussion three years of work on high speed rail as senior economist for Dalton·Dalton·Newport. My academic and professional background in marketing, finance and economic development combine with a practical business perspective as head of new ventures for our firm.

I would like to discuss four questions which I feel are at the core of the policy issues you face.

1. Market Potential - Is there a market, can high speed rail compete with other transportation modes?

2. System Characteristics - How should the passenger rail system be developed in this country: On an incremental basis starting with a passenger system combined with freight service, or starting with the full development of a separate dedicated passenger rail system?

3. Economic Impacts - What is the nature of the construction, operating and structure economic impact of developing a major high speed rail corridor?

4. Financing Alternatives - Are there innovative financing alternatives which combine both public and private involvement?

MARKET POTENTIAL

Will people choose to ride a high speed rail system? Is there a market, can it compete with other modes of travel successfully?

To answer this question, there are three areas which must be discussed. First, what market segment will the new rail system serve; second, what will happen to total travel demand; and third, under what conditions will people choose this system?

The Market Segment

High speed rail service is competitive for trips between high-density population centers that range from 100 to 300 miles apart. There is a very clear niche in the travel market for this system. It is not a short-haul system, automobiles are far more competitive in almost all aspects. Nor is it competitive on the very long trips where the airplane demonstrates clear advantages. It happens that this 100 to 300 mile trip is the one major market segment that no current transportation mode services very well. We have all heard or said such statements as: "It takes me just as long to fly there as drive," or "A really comfortable car trip is a couple of hours, over that it gets to be a hassel." Thus, we have a market segment that is not served well which creates the market opportunity for a high speed rail system.

Total Travel Demand

It is important to understand total trip demand because that will tell us a lot about the potential success of a new rail system. If total trip demand does not increase, then the only way that a rail system could be successful would be to take customers from the other travel modes - a very competitive situation. On the other hand, if total travel demand is projected to increase significantly, then a great deal of the rail travel would come from this increase in aggregate travel and less from the competition.

According to the National Transportation Policy Study Commission, total person miles traveled will increase 81% of 96% by the year 2000. The intercity market is projected to increase by 119%. This means that there will be major pressures on all transportation modes in this country to expand capacity.

What are the factors which determine total travel demand between two cities? Many studies have been done and models developed. The best predictors of total travel demand are very straightforward: population and real income. They are used as the core variables in all travel demand models. In addition, special factors (such as a state capitol or university city) and the actual level of service available between the cities influence the total travel. The higher the level of service (faster trip, lower cost, and higher quality of service) the higher the total travel between the cities. Thus, the opening of an interstate between Cleveland and Columbus actually increased the total travel between those two cities.

In our work for ORTA, Peat, Marwick, Mitchell led the effort to develop both travel demand and modal choice. Using the best models available, we projected in the range of a 25% increase in total travel in Ohio by the year 2000, depending on services available. This is an increase from 4.2 billion passenger miles to about 5 billion passenger miles. Between all the city pairs serviced by the proposed rail system there were 23.5 million trips in 1977; this is projected to raise to about 27.5 million trips by 2000 (17% increase in trips). Thus, a major portion of the market share for the rail system can come from this basic increase in travel demand.

Market Share

Even if we agree that there is a ready market potential in the 100 to 300 mile trips and there is going to be a major increase in travel demand, are people going to flock to this great new high speed rail system? Perhaps, the last factor which will determine patronage on the new rail system is speed. People will not choose to ride a train because it goes 80, 120, or 180 miles per hour. Speed is not at the core of the issue.

People make their travel mode decisions based on common sense criteria. These are:

- How long will the trip take from door to door?
- What will the total trip cost?
- What is the quality of the service?

The first two are straightforward. Quality of service represents a wide range of factors, including: frequency of service, convenience, ease of access, safety, image, and reliability. The modal choice depends on the characteristics of the people and of the trip. Thus, the same person going on a business trip might fly; but, if he was taking his family to the same location for a vacation, he might drive. The considerations, however, are all in how we balance the three determining factors of price, time, and quality.

There are many other factors which determine how people make their decisions and how well we can project those decisions. I will raise just a few to show you the complexity of developing solid projections of patronage.

- We have no specific experience on which to project high speed rail usage, there are no examples of real life situations available to us for our situation. We have some decent models which have been applied in such areas as the Northeast Corridor, but we will not really know until it happens.
- Our infrastructure in support of rail travel is weak. Our urban transit feeder systems leave a lot to be desired and an

intercity feeder rail system does not exist. This will make it more difficult to draw people away from the automobile.

- We should not underestimate the role of safety in understanding modal choice. Over the last 18 years, the Japanese "bullet train" has carried 1.8 billion people without one fatality. We will kill over 1 million people on our highways between now and the year 2000.

- Our diverse living patterns, our travel consumption patterns which stress total flexibility, our lack of actual rail travel experience, and the lower cost of competing modes all must be factored into the patronage model.

- Energy costs will have a major influence on modal choice in the future to the extent that it affects modes differently.

These are the types of factors we incorporated into our projections of patronage for the Ohio high speed rail system. Using the Cross-Elasticity Modal Split Model (Calibration CN 27), we projected traveler modal choices between each of the city pairs in the Ohio system. We estimate that at full development the rail system will capture about 18% of the total travel market. This amounts to almost 9 million travelers and 1 billion passenger miles annually. (We projected a 110 mph system would attract about 4.3 million riders per year and an 80 mph system would have about 1.5 million riders.)

The market share between city pairs varies greatly. On the 41-mile trip between Akron and Cleveland, the train achieves only a 5.2% share of the market. For the 142-mile trip from Cleveland to Columbus, the train captures 54.5% of the market.

For all trips in the State, there are some interesting results. With the full high speed rail system in operation, bus trips would still increase by 85% and air trips by 28% between the cities. Only total automobile trips decline, by 9%. The automobile still is used for 75% of all trips between the cities.

We feel that our projections are conservative. Our conclusion is that people will choose the rail alternative if it provides a level of service which is attractive. They will not choose it because it is a train or it is "high speed." They will choose it if the time, cost, and quality of service is to their benefit.

Conclusion

High speed rail fits a market segment which has not been adequately addressed in our overall transportation system. There will be a significant increase in total travel demand in the next twenty years which offers a major opportunity for a new transportation mode. Finally, if the time, cost, and quality of service are present and competitive with travelers' alternatives, they will choose the new rail system.

SYSTEM CHARACTERISTICS

How should these new rail systems be developed? Should the passenger rail system be developed incrementally starting with a shared freight system or is it essential to develop the initial system as a totally separate and dedicated passenger system?

This decision is essentially a policy issue but should be based on hard marketing, economic, and financial facts. To address this important issue, I will discuss the definition of the systems, operating and institutional issues, cost considerations, and finally the need to make the decision on a corridor-by-corridor basis.

Two Different Systems

The question most often asked is: "Can a passenger rail system co-exist with a freight system?" The answer is, of course, yes. Unfortunately, I do not think that it is the right question. In the previous section, I discussed the key factors which determine how a traveler makes his decision - time, cost, and quality. How the travel market views the rail service will determine how it responds. From the market's perspective, I feel, we are dealing with two fundamentally different systems.

Technically the systems are different. An 80-mph system co-existing with freight cannot be extended to a 150-mph system with a dedicated right of way. A 150-mph high speed rail system is just that - a total system. Every piece of the system must be integrated into one totality - track, ties, catenary, geometry, vehicles, signaling, etc. The freight and passenger systems are not synergistic at all.

The market or customer perspective is more important in understanding the difference between the two systems. This brings into focus the key difference between the two - control. In our country, any passenger system which is mixed with freight will not be able to control its schedule (i.e., two of the core factors in a traveler's decisions, time and quality, cannot be guaranteed). Thus, the differences between the two systems from a market perspective comes down to the issue of control.

Many people say that passenger and freight systems co-exist quite well in foreign countries, so why not here. Again, there are technical as well as market or institutional issues. Technically, the freight trains in Europe and Japan are shorter and much lighter than ours - this has a major impact on the ability of the systems to function together. In most countries much of the infrastructure required to separate the two already exists.

But more importantly, in the other countries there is one single rail authority charged with the responsibility to maximize usage of the total system. Institutionally, that does not exist in this country. The core of our rail system is a freight system, it is not a joint system. Freight operations, freight profitability, freight priority are the key to organizational "rewards" in the system. If you superimpose a passenger system within this context, it can only be a second class citizen. Many of the factors which the market will demand to make passenger rail successful will be lost - time, reliability, convenience, etc. Perhaps the clearest way of putting it is: "How many private railroad company executives have you heard from in the last two days are advocates of a passenger rail system?"

Operating Issues

There are many operational issues that experts far more qualified than I should address. I will discuss just the most obvious ones.

Maintenance for a freight and passenger system are very different. Perhaps an example will demonstrate this point. I understand that there are problems on the Northeast Corridor with new concrete ties cracking. This problem seems to be caused by the passenger train wheels "bouncing" on the rail. Why are they bouncing? They are bouncing because the very heavy, slow freight traffic, with less perfect wheels, is putting the rail out of alignment. The maintenance program for an exclusive freight system can be defined and implemented quite nicely. The maintenance program for an exclusive passenger system can also be developed and implemented within know parameters. When the two are put together, major problems develop which increase the total maintenance costs significantly.

There are a number of other areas where conflicts occur:

- Few places outside the Northeast Corridor have sufficient urban trackage to minimize delays. Such things as use of the mainline as part of a freight classification operation is frequent.

- A dual signaling system is required for freight and passenger systems because of differences in operating speed and braking distances. The signal system must be designed to differentiate between freight and passenger trains in terms of the signal aspects displayed to the engineer in the cab. This overlaying of systems increases complexity, can lower reliability and increase delays.

- Variable schedules frequently used by freight trains where arrival and departures can vary by many hours reduce both the safety and reliability of the passenger service. The timeliness of service is very different. If a coal train breaks down and is late a day, it is no big issue, but it sure is to the passenger train that is blocked behind it.

- Basic track design is different. For example, the superelevation required on curves for high speed operation is in direct conflict with lower speed freight operations. When a heavy freight train negotiates such curves at slow speed, it places high overturning forces on the inside rail.

There are many others ranging from union rules to the role of the Interstate Commerce Commission and Federal Railroad Administration.

Cost Issues

When evaluating which rail system to develop, cost factors must be considered. There are many system costs. We estimated that establishing an 80-mph system in Ohio would cost about $1.3 billion to capture about 1.5 million riders per year - that is about $1,000 per rider. This cost includes such items as minimum work in urban areas to allow passenger trains more freedom of access and the added signaling systems for all trains.

When considering costs, it is important to look at the costs associated with all transportation modes. To the extent that the rail system takes some of the burden off the projected major increase in travel demand, that means that capital and operating costs in the other transportation modes should be less. The total costs should be evaluated; for example, how many fewer lane miles of highways will have to added or upgraded?

Conclusion

I have made as strong a case as I can that successful freight and passenger rail systems as they will exist in this country cannot co-exist. But, in truth, the incremental or full system development is a policy decision based on many trade-offs. This decision does not and should not be made on a national basis. It should be made on a corridor-by-corridor basis. Each corridor has different characteristics - different existing rail situations, different capital cost requirements, different market conditions. Some corridors could support a viable passenger system within an existing freight system. The Northeast Corridor is a good example. There are three or four tracks in most areas, alignment characteristics in many areas are already compatible with high speed rail, maintenance is fairly good, electrification eixsts and there are many grade separations. Unfortunately, that does not exist in very many places in the country. It will be important to look at each corridor individually and evaluate all the trade-offs in service, ridership, capital costs, etc.

Underlying the above caveat is my belief that a successful quality passenger system can only be developed if it can control its own operation and provide the level of service in time, costs and quality that is essential for its success, independent of speed.

ECONOMIC IMPACTS

What are the probable economic impacts generated from building and operating a high speed rail system in Ohio?

The Dalton·Dalton·Newport consultant team has developed initial projections of the economic impacts which the proposed Ohio high speed rail system will generate. We have evaluated the range of direct and indirect effects on regions of the State, the entire State, and the midwest "heartland." I will discuss three areas of impact:

- Construction impacts
- Operating impacts
- Structural impacts

One caveat: Our economic studies, while based on the best available data using the most applicable econometric models from both the private and public sectors, are preliminary studies only. There are a lot of numbers; use them cautiously. I feel they are in the ballpark - concentrate on their magnitude and not the fourth decimal point. We have a number of studies and background reports available through ORTA. Our capital cost information was built up from every bolt and tie we projected for construction. We used Chase Econometric models as well as the best available 495 sector input/output RIMS model from the United States Bureau of Economic Analysis in the Department of Commerce.

Construction Impacts

The total estimated construction cost is about $5.7 billion in 1978 dollars with about $1.6 billion for the Columbus-Cincinnati segment and approximately $1.3 billion for the Columbus-Cleveland segment (the 3C Corridor).

About one-half of the budget goes to wages. Over the entire construction period, it will require 46,000 person-years of work with peak employment between 7,000 to 8,000. The rest of the funds go toward the purchase of equipment and construction materials directly. This means about $2.8 billion for steel, cement, stone, fabricating, equipment, communication systems, etc.

Expenditures for the various components of the project are interesting:

Structures	$ 2 billion
Track work	$800 million
Roadway preparation	$400 million
Electrification	$450 million
Right of way	$ 80 million
Signals and communications	$120 million
Vehicles	$220 million

The direct industry purchases are also impressive:

Primary metal products	$740 million
Quarry	$ 99 million
Chemical and rubber	$195 million
Fabricated metals	$465 million
Transportation, communications and utilities	$200 million
Wholesale and retail	$295 million
Machinery	$200 million

But that is only for starters. What the $5.7 billion really means, when the economic multiplier effects are taken into consideration, is at least $18 billion in total economic impact for Ohio and the region:

- Over 150,000 person-years of wages - 20,000 to 25,000 jobs in the peak year.

- $6 to 9 billion in purchases from industry.
- Hundreds of millions of tax dollars paid by industry and workers.

For specific industries there are major implications; a few examples are:

- For the chemical and rubber industry the $195 million in direct purchases increases to over $600 million of total impact.
- The $200 million directly purchased from transportation, communications and utilities jumps to over $900 million.
- $1.5 billion is generated for wholesale and retail trade.
- Over $600 million is added to the finance, insurance and real estate industry.

The biggest impact is on households where about $4.5 billion is paid in wages, salaries and dividends.

Operating Impacts

Our conservative estimate is that the system will carry about 9 million people annually for approximately 1 billion passenger-miles per year. It is projected to generate about $155 million in annual revenues (1978 dollars). With estimated operating and maintenance expenses of $105 million, about a $50 million gross operating margin is generated annually.

In current dollars the system will pump over $100 million annually into Ohio's economy in construction, maintenance, equipment, supplies, and wages - about 2,700 new jobs, $60 million in wages.

When the multiplier effects are considered, the annual level of economic activities generated by the operating system is about $400 million each and every year - 8,000 to 10,000 jobs in the economy, from welders to T.V. repairmen.

We have been able to make some estimates of the operating expenditures generated in regions of the State. Let me take Columbus as an example. We assumed that Columbus will be the headquarters and maintain one-half of the lines between each of the major urban centers and Columbus. Using the RIMS model, we estimate $41 million annually in direct Columbus region expenditures by the system with $8 million lost to imports; that means a net of $33 million in direct regional expenditures. The gross annual impact is over $122 million on the Columbus SMSA when multiplier effects are included.

- $36 million to the construction and maintenance trades.
- $1.5 million to paper and printing.
- $2.5 million to chemicals and rubber.
- $5.5 million to transportation, communications and utilities.
- $11.2 million to wholesale and retail trade.
- $6.6 million for finance, insurance and real estate.
- $11 million to services.
- $39 million to households.

Structural Impacts

Now, I would like to briefly discuss what I consider the most significant long-term economic impact - the structural effects on the State.

Transportation is at the core of all major economic development in history - from sailing ships to canals to roads to trains. This basic infrastructure is essential to any economic growth program.

One of the central economic considerations is the economic vitality of the "heartland," which was so effectively analyzed in Forbes last spring. There is much that can be said about the "heartland" - and you know most of it, the strengths and the weaknesses.

- Forty million people, a GNP of over $500 billion, and world industrial leaders.

- Concurrently over 400,000 manufacturing jobs lost in the last 10 years, a capital drift out of the region, and a negative federal balance of payments in just the last 5 years of over $110 billion.

Then, what happens to an economy when we:

- Introduce a major, new, high technology transportation system linking all the industrial and commercial centers of the State.

- Take the leadership in developing a new rail technology industry.

- Build a more attractive environment to locate plants and corporate headquarters.

- Create the economic vitality and growth which alters the economic psychology of the region.

It will assist the older industrial segments of the region which have and will continue to experience problems. It can provide new growth markets, improved competitive position, more jobs, and many job transfer opportunities. The entire State will change. Each region will be affected differently based on their current economic base and their ability to respond to new economic growth opportunities.

Conclusion

The construction impacts are similar to those of any major construction program - big. They have a particularly supportive impact on the very industries in the midwest which need the most help. The operating effects provide significant ongoing economic benefit to the State in the form of jobs and purchases from a broad range of companies. Perhaps the biggest, but least measurable, impact is the effect on the economic structure of the State when a new technology and transportation system are put in place.

FINANCING ALTERNATIVES

How will these new high speed rail corridors be financed? What are the public and private options?

The bottom line on any high speed rail project will be the financing. Financing is based on the basic economic viability of a corridor to support all or a major portion of its capital costs. As we say in the venture capital business, there are three determinants of a deal - cash flow, cash flow, and cash flow. The operating margin of revenues over operating costs will determine the nature of the government role in each corridor.

It would be great if we could say that a corridor would support complete private capitalization of a project. There may be some corridors where this is possible. To my knowledge, however, no major transportation network has ever been developed in history without significant government support and incentives.

Each potential corridor will have to be evaluated separately and each will support a different mix of public and private participation based on its unique characteristics. One of the most interesting aspects of this movement in high speed rail is that there does not need to be a single financing scheme. In fact, it is far better to fit the financing plan to the economics of each specific project - operating characteristics, institutional and organizational structure, cost and revenues from operations, technological issues, staging, etc.

The character of financing options which are feasible will also have a major impact on the way in which the actual system is developed. The more private financing, the more likely that corridor development will have to be staged in segments with major emphasis on getting those segments into revenue service. (All too often in this country we feel we must build the whole system "now" and not do it on a staged basis - this is a lesson that has already been learned in Europe and Japan.)

In this section, I would like to discuss several points.

- Government participation
- The Ohio financing plan
- Foreign financing experiences
- Alternatives to public financing
- Foreign financing

Government Participation

Perhaps the most critical rationale for government participation is that it is highly unlikely that any project will proceed without some form of government support. There are many reasons why this support is worthwhile.

- There would be direct and measurable impacts on the investment requirements in other governmentally supported transportation systems. To the extent that high speed rail in a corridor will offset the need for other capital investment, it is worth government participation. For example, a high speed rail system in a corridor would mean less construction costs required for new or expanded highway facilities as well as less maintenance costs.

- Governments have traditionally supported major transportation systems because there are significant economic development and growth implications for an economy - jobs, income, new businesses, etc.

- Transportation is basic to business stimulation. We need a special emphasis on those areas of the country that need support in altering their industrial base to fit the 21st century, it is in our own competitive self-interest. High speed rail offers the opportunity to introduce a new technology to this country which can be directly translated into new products for old industries.

There are many ways that the government can participate in the development of a high speed rail corridor. I have grouped them into three categories.

- Direct capital subsidy through public funds to cover all or part of the capital costs.

- Indirect subsidy through such vehicles as loan guarantees (the cash flow still has to be generated in the system), interest rate subsidies, fare subsidies.

- Special incentive programs offer a range of options including such things as: use of enterprise zones, tax increment financing, use of induced development around stations, and other "sweeteners."

Ohio Financing Plan

Dalton·Dalton·Newport, with Peat, Marwick, Mitchell, was charged to evaluate a selected group of public financing options that included the gas tax, income tax and the sales tax. We were to look at the financing of the full system of 550 miles at the fastest reasonable construction pace on a pay-as-you-go basis.

What did we find out?

- The operation of the system will generate a significant operating surplus, based on our conservative patronage elements. But our best professional judgment is that patronage levels and thus revenue cannot generate sufficient funds to support the full construction costs of the system. Operations can generate a meaningful cash flow to support some level of capital payments (in the range of $500 million). We did use these surpluses in developing our overall net capital needs.

- A 1% sales tax for 15 years will generate sufficient capital to build the entire system on a pay-as-you-go basis when investment income on net balances and operating surpluses are considered.

- There are any number of variants which can be considered within the public financing of the capital program:

  - Using proceeds to retire a long-term bond issue would mean a lower percent sales tax is required.

  - A slower construction schedule or a segmental approach would alter the timing of the heavy capital requirements and thus the size of the tax rate needed.

Financing is the central element of the overall strategy for the project. It hinges on many other elements - refined patronage data, staging decisions, and the basic organizational structure chosen to construct and operate the system.

Foreign Experiences

We can learn from the French and Japanese experiences, picking the best from each. But we must be very careful in transferring costs and methods to our situation. Both systems' high speed lines operate at a profit. Both countries also heavily subsidize their rail systems.

The French TGV system used private financing including quite a bit of United States capital. They did it in a form essentially similar to our tax-free municipal bonds - they were guaranteed by the French National Railway (SNCF) and the Federal Government of France. It must be remembered in comparing our situation to France that SNCF generates two-thirds of its revenues from freight and that 22% of its passenger revenue is direct federal subsidy.

Japan used some innovative financing methods including subsidized interest rates. Their ridership, however, is over 12 times the projected patronage in Ohio.

Alternatives to Public Financing

We can look at a number of options besides total direct public capital subsidy. A high speed rail system must be operated as a "business." All of the private financing options must focus on those aspects of the system where there is sufficient cash flow from operations to cover capital investment costs. Options include any one or a combination of the following:

- Indirect subsidy such as lowered interest rates, subsidized rates, or tax exemption.

- Loan guarantee programs for bonds issued on gross operating margins.

- Collateral loans on selected parts of the system like rolling stock or vehicle leasing programs.

- Granting of special licenses or concessions for fee on major project profit centers.

- Vendor/supplier financing.

Foreign Financing

A great deal of interest has been demonstrated by at least two foreign countries. We know that the technology exists for high speed rail and it would seem logical that we utilize that existing technology.

The use of foreign capital is a delicate subject. For decades we have poured capital into other parts of the world. It has accrued to their benefit and to our benefit. Our world is changing, there are now a number of countries from whom we can learn and take advantage of their expertise. We have gone through more than one period in our history where foreign capital and technology were key to our own country's economic vitality and growth. Our experiences over the last 30 years should help us understand "how to do it right."

Be it Japan, France or Germany, we can form partnerships to build the infrastructure, technology, and productive base in this country. If we build 1,000 miles of high speed rail, it means $15 to $20 billion in direct economic benefits ($45 to $60 billion in total impact), much of that would go into the sectors of our economy that need assistance - construction, steel, cement, machine tools, jobs. Properly done it can be a "positive-sum game" for all parties involved.

- Do not reinvent the technology. It will have to be "Americanized" to fit our situation. Those modifications will be major.

- Set up agreements on technology transfer.

- Develop requirements that major portions of the work be done in this country.

- Implement hard-nosed procurement programs. Perhaps, require direct links with American-owned firms with the objective of developing long-term jobs for our economy.

- Emphasize those areas of the country which need the economic revitalization.

Conclusion

Public financial participation in some form will be required in the development of high speed rail in every corridor. The character and mix of a financing program should fit each corridor based on its particular situation. No single financing scheme will fit all corridors. Innovative private financing vehicles should be investigated for each corridor. Create a positive but guided environment in which foreign investment can participate in the development of high speed rail in this country.

CONCLUSIONS

My remarks have concentrated on four areas - the market, system characteristics, economic impacts, and financing alternatives. There are a number of common threads which exist in all of these areas.

- The market exists if the quality of service is there. People will ride the trains because they offer competitive time, cost, and quality of service. High speed rail systems fit a market segment that is not currently serviced well - the 100 to 300 mile trip. Increased total travel demand generates a real opportunity for a new transportation mode.

- While it is possible to develop a passenger system which shares its facilities with a freight operation, a successful quality passenger system can only be developed if it can control its own operation through a dedicated, fully integrated system.

- The economic impacts from construction and operations are real and significant. High speed rail offers the opportunity to create a new technology, new jobs, and revitalize older industries. It can have a major structural impact on the economy of a region.

- Public financial participation in some form will be required in the development of high speed rail in virtually every corridor. The character and mix of financing will vary from corridor to corridor. Innovative private financing options should be investigated.

There is a great deal of foment taking place in this country in high speed rail. It is generating interesting ideas and challenging approaches to developing a very important transportation opportunity. To date, there is no overall single approach and, I believe, that is good and should be stimulated. We are seeing in high speed rail the re-emergence of states as entrepreneurs in economic development. We should encourage this entrepreneurship. We should not establish a "single, sole, only way" to do things - at least not now. A more varied approach will provide faster development, more innovative approaches, and a better system.

We are lucky because of the nature of the high speed rail market. The corridors where high speed rail is going to take place in the next 50 years are quite easy to identify. There are several regions that are separated from each other. This will allow variability and it should be nurtured. This is the American Way. Each corridor will have to stand on its own on economic terms. Each corridor will have to be justified on its own merits. Each corridor will require different types of technological solutions, different system characteristics, different financing schemes, and different institutional or organizational structures. Do not force them all to be alike, it is not necessary.

A good example is the emerging corridors of the 1950's prior to the National Highway Act of 1956. States took the initiative in the development of turnpikes. From each one we learned a lot. Linkages emerged as required, as the parties saw that getting together was in their self-interest. These individual projects set the stage for the national system. Those early systems prioritized themselves and were based on good hard economic reality. They continue to be among the highest used and are generally the best maintained of all the major highways in the country.

There is a very important role for the Federal Government in high speed rail. It is critical. There must be a balance between allowing and stimulating this creative foment for development; yet, providing a framework in which it can operate to best fit our overall transportation system needs.

APPENDICES

EXISTING AND PROJECTED TRAVEL MARKET CONDITIONS - SELECTED CITY PAIRS

		Base - 1977		With Rail - 2000	
City Pair	Mode	Travellers (000s)	% Total	Travellers (000s)	% Total
Cleveland-Columbus 142 Miles*	Auto	807.6	87.6	611.7	36.4
	Bus	61.2	6.6	92.7	5.5
	Air	52.6	5.7	59.4	3.5
	Rail	0	0	916.4	54.5
Columbus-Cinc. 107 Miles	Auto	750.2	92.2	751.6	60.9
	Bus	51.2	6.3	104.1	8.4
	Air	12.0	1.5	20.2	1.6
	Rail	0	0	357.9	29.0
Columbus-Toledo 135 Miles	Auto	298.8	92.3	279.5	43.3
	Bus	13.8	4.3	31.5	4.9
	Air	11.0	3.4	15.8	2.5
	Rail	0	0	317.6	49.3
Toledo-Cleveland 112 Miles	Auto	896.3	92.2	707.7	50.2
	Bus	58.1	6.0	81.5	5.8
	Air	15.3	1.6	19.7	1.4
	Rail	2.1	.2	600.6	42.6
Cleveland-Akron 41 Miles	Auto	7409.9	98.9	6837.9	92.5
	Bus	79.5	1.1	161.8	2.2
	Air	0	0	.5	0.0
	Rail	0	0	388.6	5.2
Cleveland-Youngs-town 69 Miles	Auto	2362.2	97.5	1975.8	80.5
	Bus	58.9	2.4	101.9	4.2
	Air	.5	0.0	.9	0.0
	Rail	0	0.0	376.5	15.3
Dayton-Cinc. 54 Miles	Auto	8547.6	97.1	8312.2	81.5
	Bus	247.8	2.8	491.0	4.8
	Air	8.5	.1	15.5	.2
	Rail	0	0	1380.8	13.5
Cleveland-Cinc. 249 Miles	Auto	218.1	74.3	138.8	26.7
	Bus	25.9	8.8	33.7	6.5
	Air	49.5	16.9	45.4	8.7
	Rail	0	0	301.8	58.1
Detroit-Cleveland 170 Miles	Auto	480.9	65.8	360.6	34.1
	Bus	30.8	4.2	58.9	5.6
	Air	219.1	30.0	296.4	28.0
	Rail	0	0	341.9	32.3
Pittsburgh-Cleveland 129 Miles	Auto	717.7	89.1	543.7	56.8
	Bus	30.4	3.8	57.2	6.0
	Air	57.5	7.1	74.0	7.7
	Rail	0	0.0	282.6	29.5

*Highway miles between cities.

PROJECTED DIRECT AND INDIRECT ECONOMIC IMPACT OF OHIO HIGH SPEED RAIL PROJECT ON 19 MAJOR INDUSTRIES

Explanation of Tables

The first table presents, in detail, the projected direct and indirect economic impacts of the high speed rail project on 19 major industrial groupings.

- Down the left side are the 19 industry groupings.

- Columns (a) and (b) show the expenditures in each industry, statewide, during the construction period. Column (a) is the direct expenditures by ORTA for construction. Column (b) includes both direct and indirect (multiplier effect) expenditures to each industry.

- Columns (c) and (d) show the estimated annual operating expenditures statewide for each of the 19 industry groupings. Column (c) is the direct annual expenditure on operations and Column (d) represents the total statewide economic impact on each industry group from operations.

- Column (e) represents statewide employment in the industry.

- Columns (f), (g) and (h). present annual operating expenditures and employment in the Columbus SMSA. Column (f) is the estimated expenditures each year by ORTA with each of the 19 industries. Column (g) represents the total annual economic benefits generated to each industry, both direct and indirect.

The second table is a sample page from the report. There are industry pages in the report similar to the attached. Each presents a summary of the projected impacts on that industry generated from constructing and operating the high speed rail system in Ohio and the Columbus region. The page lists the types of products likely to be purchased from that industry grouping. These pages will help assess the likely impacts on a region.

CONSTRUCTION & OPERATING PROJECTIONS OF THE ECONOMIC IMPACT SUMMARY OF THE HIGH SPEED RAIL PASSENGER SYSTEM IN OHIO[7]

	OHIO - STATEWIDE					COLUMBUS REGION		
	CONSTRUCTION PERIOD EXPENDITURES (000,000)		ANNUAL OPERATING EXPENDITURES (000,000)		1980 EMPLOYMENT	ANNUAL OPERATING EXPENDITURES (000)		1980 EMPLOYMENT
	Direct (a)	Total (b)	Direct (c)	Total (d)	(e)	Direct (f)	Total (g)	(h)
1. Agriculture & Mining	$ 3.1	$ 129.8	*	$ 2.2	45,681	$ 5.0	$ 444.0	N/Av
2. Quarry Industry	98.5	129.1	$ 0.8	1.0	4,372	280.0	310.0	N/Av
3. Construction	7.1	3,753.6	1.3	92.7	174,284	489.0	36,858.0	21,600
4. Food, Tobacco & Kindred Products	0.7	395.9	*	9.1	72,828	4.0	2,910.0	10,600
5. Textiles & Apparel	1.0	40.7	0.1	0.9	22,272	14.0	65.0	N/Av
6. Lumber, Wood & Furniture	22.2	48.6	1.0	1.5	29,529	17.0	108.0	N/Av
7. Paper & Printing	20.2	247.4	0.2	4.2	106,039	57.0	1,150.0	8,900
8. Chemicals & Rubber	194.2	607.9	1.8	8.6	160,379	664.0	2,532.0	9,200
9. Stone, Glass & Clay	270.1	333.1	0.5	1.1	64,669	114.0	249.0	9,400
10. Primary Metal Products	738.0	1,247.2	2.4	6.6	139,863	108.0	289.0	N/Av
11. Fabricated Metals	464.0	1,857.5	3.5	5.4	157,718	1,353.0	1,846.0	10,600
12. Machinery	202.5	410.9	2.0	4.9	320,163	561.0	1,072.0	12,100
13. Transportation Equipment	38.2	463.1	0.3	4.8	138,433	28.0	1,005.0	5,700
14. Misc. Manufacturing	18.4	173.7	0.2	0.9	53,091	58.0	172.0	N/Av
15. Transportation, Communication & Utilities	200.0	936.0	3.4	25.8	193,780	1,274.0	5,444.0	25,000
16. Wholesale & Retail Trade	292.2	1,468.4	5.9	30.6	962,433	2,331.0	11,201.0	125,000
17. Finance, Insurance & Real Estate	53.0	603.7	1.3	12.9	199,564	639.0	6,623.0	40,100
18. Services	184.4	1,481.9	3.0	28.5	742,537	1,414.0	11,080.0	111,100
19. Households[3]	1,727.6	4,446.4	59.2	103.7	N/A	23,561.0	38,475.0	N/A
TOTAL[4]	$4,535.4	$18,774.9	$86.9	$345.4	3,587,635[5]	$32,971.0	$121,833.0	515,200[6]

FOOTNOTES TO TABLE

* Less than $50,000.00.

N/A - Not applicable.

N/Av - Not available due to Ohio disclosure laws.

[1] Direct purchases by ORTA.

[2] Total includes direct plus indirect multiplier effects.

[3] Households are defined as wages, salaries, rents, interest and dividends paid to households and personal incomes of sole proprietors.

[4] Excludes land costs and required imports.

[5] Does not include 500,000 government employees.

[6] Includes government employment (93,500) and other undistributed employment.

[7] Table generated from RIMS model runs September 1981 - 19 x 495 sectors.

SAMPLE INDUSTRY PAGE

INDUSTRY: TRANSPORTATION, COMMUNICATIONS AND UTILITIES

TOTAL IMPACT FROM PROJECT	STATEWIDE	COLUMBUS (SMSA)
CONSTRUCTION PERIOD	$936.0 million	N/A
OPERATING PERIOD	$ 25.8 million	$5.4 million
INDUSTRY EMPLOYMENT	193,780	25,000

ORTA INDUSTRY REQUIREMENTS

ELECTRICITY
PHONE SERVICE
NATURAL GAS
WATER
SEWER SERVICE
COMPUTER SERVICES
TV SECURITY CAMERAS
WORD PROCESSING
WIRING
RADIOS
TELEPHONE SYSTEMS

INDUSTRY: WHOLESALE AND RETAIL TRADE

TOTAL IMPACT FROM PROJECT	STATEWIDE	COLUMBUS (SMSA)
CONSTRUCTION PERIOD	$1,468.4 million	N/A
OPERATING PERIOD	$ 30.6 million	$11.2 million
INDUSTRY EMPLOYMENT	962,433	125,000

ORTA INDUSTRY REQUIREMENTS

FOOD SERVICES
PAPER PRODUCTS
MAINTENANCE EQUIPMENT
OFFICE EQUIPMENT AND SUPPLIES

N/A NOT APPLICABLE
N/AV NOT AVAILABLE DUE TO OHIO DISCLOSURE LAWS

Mr. **Glickman**. Thank you very much for that excellent testimony.

Yesterday the vice president of the American Association of Railroads gave what I considered to be fairly negative testimony regarding all of the things that we are talking about today. He was not negative on the technology. I think he was negative on the implementation of the operation of any new high-speed rail, whether it be corridors or national. But you gave me a clue to what his reasoning might be today. You say the American rail system is a freight system.

Dr. **Webb**. Yes.

Mr. **Glickman**. Certainly the American railroads are freight railroads. Without reading his mind, do you think the American railroads today might be concerned that the things that we are talking about today might be a threat to their ability to continue doing business?

Dr. **Webb**. I think that is true. I have talked to various groups for 3 years on high-speed rail, primarily on the economic impacts, and there has been a lot of resistance when I talked to railroad people and railroad unions about high-speed rail.

The conclusion I have come to is that we have a freight rail system, that is their view of the world. They can't perceive of putting passengers on their freight system and they are right.

We are talking about a very different kind of transportation mode.

Mr. **Glickman**. I think it is an important point to get at because it is difficult, institutionally, to do a lot of the things you are talking about today and not have at least some support from people who operate the rail system in America today.

Otherwise, the mass public seems to believe that it is not a very practical productive alternative. They see the railroads have given up on passenger service generally. They see Amtrak having not been a terribly wonderful success. They want to know how can we develop anything that moves in the next generation of technology, when all of our experience has been negative experience?

Dr. **Webb**. Yes.

The freight system needs its control as much as a high-speed rail system needs control. They are attempting to be competitive in an extremely competitive environment, far more competitive than other countries, e.g. we have the interstate system with the trucks. It is a very competitive system that the railroads face today.

They are sufficiently different in their views of the world that we will never see them come out in strong support of high-speed rail passenger service.

On a couple of radio talk shows in which I have participated, people said, "well, how can you ever get a high-speed rail system when Amtrak can't even run trains?" It is important to undertand that Amtrak cannot succeed in providing a passenger system as long as it is forced to operate with a freight system. It is not possible.

Amtrak can't control the scheduling and convenience that is necessary to make it successful.

Mr. GLICKMAN. Your estimate for the model split market capture by passenger rail do not appear to be supported by historical experience in the United States. Do you think we are overly optimistic?

Dr. WEBB. I believe our projections are overly conservative. We have some problems in projecting patronage on high-speed rail. We have little experimental data base. We don't have data of a high-speed rail system in operation in our culture that would provide empirical data. We do not have sufficient rail infrastructure, neither an effective urban transit system, nor an effective feeder rail system. We don't have the rail travel habits, consumer behavior habits. Thus, making these projections is extremely difficult.

We use the best models that are available with Peat, Marwick & Mitchell and they have done as much rail patronage projection work as anyone in this country.

As far as I am concerned, they used as good a model as we have in projecting patronage and I think it is conservative.

Mr. GLICKMAN. Let me go back to my question about airplanes. I don't want to see the Federal Government get into an affirmative role that provides preferential treatment for one transportation mode over another and that might cause a significant competitive advantage over another transportation sector. How would high-speed rail impact aviation?

Dr. WEBB. We have done that quite a few times in the past, however, by giving preferential treatment to one mode over the other. Though I agree with you, we should not do it anymore.

I do not see direct competition between the airplane and the high-speed rail systems that we are talking about. There is a major gap in the market in the 100- to 300-mile trip that is not effectively provided by the airplane or by the automobile.

So I do not see any conflict at all when we are talking about the kind of high-speed rail technology represented by France or Japan. When we get to magnetically levitated trains, that is another story. We are dealing with something that extends the competitiveness of that mode much farther than 300 miles.

Mr. GLICKMAN. What if we develop aviation technology that comes up with effective STOL aircraft. It can take off in 300 feet or less and, therefore, can fly from downtown to downtown? Then where are we?

Dr. WEBB. I don't see them being able to carry the capacity that a rail system can carry, nowhere near the capacity. There is also a safety factor. One of the interesting experiences on the Japanese Shinkansen is 1.8 billion people traveled without a fatality while we project in the range of 1 million people killed on our highways before the year 2000.

Mr. GLICKMAN. Is not there a real potential problem with the development of many different high-speed systems that may be incompatible with each other? You have a mag-lev in Florida and a Shinkansen in California and a hybrid in Chicago. Does it make any difference?

Dr. WEBB. It is important in the early development of systems to allow as much variability as we can, allow the foment to be there. We would tend to get better systems. At some point those conflicts would begin to grow.

Let's take the Los Angeles to San Diego corridor and let's say they use the Shinkansen bullet train, but the Las Vegas to Los Angeles corridor goes to mag-lev.

I see no problem with that. They are different kinds of trips. We frequently deal with airplanes where we will go on a trip and make a change in planes. Within a region you should do your best to coordinate them. But if the difference is that we get mired in the bureaucracy so much that they don't get done, I might be more willing to accept some variability in it even in a region.

We have a Florida system, a West Coast system, a Texas system and a Midwest system that probably would never be connected. I personally am not opposed to allowing them to develop differently.

Mr. GLICKMAN. Do you think that these systems need to be integrated with urban mass transit systems to be successful?

Dr. WEBB. Absolutely. We have to be able to feed people into the rail system. Ours are not strong enough. The stronger the urban transit system, the stronger the rail usage will be.

Mr. GLICKMAN. I would like to finally ask you again, what the Federal role should be. In your testimony you indicated chief encourager, maybe loan guarantor, maybe there is a big difference between the two.

Dr. WEBB. I did offer a range of options.

Mr. GLICKMAN. What do you think the Federal Government's role should be regarding high-speed passenger rail systems? What should the government do?

Dr. WEBB. I have not closed on that personally as I look at the development of this technology in this country. Our policy should encourage as much private financing as can be supported. I am convinced that there will have to be loan guarantees for the systems to develop, even where we have a system where the cash flow covers construction costs. Loan guarantees where that happens, could be the difference between the system development or not. That is probably as far as I would go from the Federal Government.

I would not propose direct subsidy.

Mr. GLICKMAN. Are you familiar with the Farm Credit System in this country?

Dr. WEBB. No.

Mr. GLICKMAN. There is a system of financing through the Farm Credit System, established many years ago, that enables farmers to go and borrow money and the Farm Credit System finances that by selling certificates. They are not guaranteed by the Government but they are guaranteed by the full faith and credit of the United States, so ultimately they are guaranteed. But there is no real, what you would call day-to-day loan guarantee.

They are a quasi public-corporation. They exist only through the graciousness of Congress. So there may be a hybrid type of financing arrangement available other than the kind of loan guarantees that we are seeing now in Synthetic Fuels Corporations, where you have the direct Government involvement.

I assume that if the technology developed and it was being demonstrated in many parts of the country there may be other ways of financing it.

I suppose it depends on what stage of development you are in to determine what type of financing you would use.

Dr. WEBB. The first ones will be more difficult. Once it has been proven, as was stated earlier today, the financing will be easier.

The other point is what the economics of each corridor tell us. Whenever a private loan is guaranteed, we had better be sure that it is covered by the operations of the system. You can't guarantee a loan unless that cash flow is there to pay it back or it will end up being just a direct subsidy.

So each one will be a little different.

Mr. GLICKMAN. Now, were you in the room when Mr. Harp from Northrop gave his testimony about a Rail America, the national rail system?

Dr. WEBB. Yes.

Mr. GLICKMAN. Do you have any comments on that?

Dr. WEBB. No; it was a very interesting idea but I have no particular comment on it.

Mr. GLICKMAN. Had you heard about it before?

Dr. WEBB. No.

Mr. GLICKMAN. I was just curious.

We thank you for coming here today to testify. You added an effective conclusion to a 2-day hearing which I thought was very useful. I would say that I am hopeful that the committee could come up with a committee report with some conclusions and recommendations to spearhead some of the ideas that have been presented at this hearing.

I want to thank the committee staff for their help in setting up these hearings. We are adjourned.

[Whereupon, at 3:17 p.m., the subcommittee was adjourned.]

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